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The Role of Proximity in Determining Public Support for Nuclear Energy

by

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Dedication

I dedicate this thesis to my friends and family who have supported me along my journey to earn a master's degree. First of all, a word of gratitude to my loving parents, Michael and Mary Cohen, who have encouraged and motivated me to keep going every step of the way. My wife Iris who has never left my side and has put up with me for many nights of endless writing and research. I also dedicate this work to my many acquaintances and church family who have supported me throughout the process. I will always appreciate all they have done. I finally dedicate this work and give special thanks to my son William for being there for me and helping me de-stress during stressful times. You and your mother have both been my best cheerleaders.

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The Role of Proximity in Determining Public Support for Nuclear Energy

Thesis Abstract – Idaho State University (2019)

Nuclear energy has become increasingly popular as an alternative to fossil fuels. In this study, I examine public support for nuclear energy across the United States relative to the geographic proximities of stakeholders to nuclear power facilities. I seek to determine whether proximity to nuclear power sources is associated with the public's perception of nuclear power. Theoretically, this project will enable me to determine how proximity influences the public's perception of nuclear power. Practically, this relationship could help inform decision makers about where support or resistance to nuclear energy may be concentrated to allow more targeted efforts to inform citizens about the safety features and benefits of this energy source. I utilize Geographic Information Systems (GIS) to quantify the distances between survey respondents and various nuclear power sites, and present two models analyzing how proximity to nuclear power sources affects people's opinions about nuclear energy. The analyses reveal that proximity is not a predictor of support for increasing nuclear power in general but does predict support for expanding nuclear energy production over the next quarter-century. The ramifications of these findings are then discussed.

Key Words: Nuclear energy, nuclear power, proximities, perception, zip codes, geographic boundaries, distances, respondents, nuclear power sites, nuclear energy production, attitudes, demographics, knowledge, risk, policy support

Chapter 1: Introduction

Scientists, engineers and decision-makers have called for the deployment of nuclear energy for numerous reasons. Most prominently, the inability of current electric generation capacity to meet market demand for electricity and the absence of greenhouse gas emissions associated with using nuclear power spark interest in investing in this highly controversial energy resource (Harvey, 2011; Intergovernmental Panel on Climate Change, 2001, 2007). Existing energy transmission and generation sources are often running at full capacity across the United States, and many places in the northeastern, southwestern and western parts of the country cannot meet the demand for electricity when it reaches its peak (North American Electricity Reliability Council, 2006). To ensure an adequate amount of energy is available, officials must expand electricity capabilities in these regions to increase energy supply. Also, since fossil fuel combustion is the largest source of greenhouse gas production in this country, nuclear energy is a viable alternative since it does not produce any emissions (U.S. Environmental Protection Agency, 2013).

Although public support for nuclear energy plummeted following the Three Mile Island and Chernobyl disasters, polls subsequently found public support steadily rose throughout the 1990s and 2000s. Suddenly, just as it appeared that most of the public was in favor of nuclear energy, the Fukushima disaster occurred in 2011, causing support to once again tumble (Stoutenborough et al., 2013). It is not surprising that support for nuclear energy would drop following a disaster like this because the public would perceive nuclear power as very dangerous. However, the fact that a big divide exists between the public and scientists on this matter is troubling as this is probably what blocks nuclear energy deployment in the United

States. If the public is not in favor of its development, nuclear energy will not be deployed as policymakers will have little reason to promote it.

Understanding the factors that cause some people to support nuclear energy and others to oppose it is essential to understanding why the perceptions of scientists differ from those of the public. Nuclear power is very complex as it can potentially cause catastrophic disasters and generate radioactive waste that needs to be transported and stored. People overall fear the harm that nuclear power can cause because they do not understand its benefits or the safety features of current technologies, meaning that a large portion of the American people are not educated about the issue. Multiple facets of nuclear energy must therefore be considered and addressed for scientists and decision-makers to arrive at a safe and scientifically-sound decision on when, where and how to deploy this electricity source.

Models examining the influences that cognitive factors such as attitude, knowledge, and risk have on nuclear policy support are essential to understand the underlying values that lead people to support or oppose such policies. It is necessary to understand who holds various viewpoints on possible nuclear risks and solutions because research suggests these viewpoints are likely influenced by attitudes and demographic indicators (Bies et al., 2013; Robinson et al., 2013; Stoutenborough and Vedlitz, 2014). However, additional analyses are needed to understand the issue in its entirety as these observations fail to account for geographic proximity, a potentially important causal mechanism. It makes sense to suppose that individuals living near nuclear power plants will be more likely to be aware of the benefits and safety features of current nuclear technologies because they are constantly exposed to this information through people in their communities and news media outlets.

Currently, the relationship between geographic proximity and public support of nuclear energy has been examined very little in the academic literature. Most publications emphasize that demographics, attitudinal and value indicators, knowledge, and risk perceptions determine nuclear policy support. Nevertheless, they do not consider proximity, and could therefore be biased as a result (e.g. Stoutenborough et al., 2013). Other studies have examined how geographic proximity affects public support for policies in other domains, for example, water and climate change. They have concluded proximity to places where problems from water shortage and climate change take place increases the likelihood that people from those areas will support policies designed to address these problems (e.g. Mahafza et al., 2017; Brody et al., 2008). Ultimately, the same idea should apply to the nuclear sector, and I conduct this study with this focus in mind.

In this paper, I use public opinion data of adults in the United States collected by GfK (formerly Knowledge Networks) to measure how much individuals support using nuclear power as an energy source. I use these data, along with the zip codes of the survey participants and a Geographic Information Systems (GIS) package called ArcMap, to quantify the distances between the respondents and their nearest nuclear power sources to determine the effect an individual's proximity to nuclear facilities has on his or her opinions about nuclear power. This study will contribute to our understanding of how proximity affects nuclear policy support and inform decision makers about where support or opposition to nuclear power is concentrated so efforts may be made to increase support in areas where opposition is high. The analyses reveal the importance of proximity in predicting support for increasing nuclear power, and the ramifications of this finding are discussed.

Chapter 2: Literature Review

Determinants of Nuclear Policy Support

While I am primarily concerned with geographic proximity in this study, it is necessary to control for other theoretical perspectives that are emphasized in the academic literature to produce a significant effect on public perceptions of nuclear power. Examining the interactions that take place between these explanations and geographic proximity will ensure this study captures what is really influencing opinions on this matter at the individual level. I will examine four of these perspectives along with proximity in this paper, and I present the significance of each one in the following sections.

Attitudes and Demographics

Considerable evidence exists demonstrating that attitudes, values and demographic characteristics explain policy preferences in the political science literature. Many social scientists emphasize that values strongly shape worldviews, forming "orienting dispositions" that determine how people think and behave in complicated situations (Dake, 1991; Leiserowitz, 2006; Wildavsky and Dake, 1990). From this perspective, it is clear how policy support emerges as a result of the individualistic, fatalistic, hierarchical, and egalitarian worldviews and social relationships that form and later predict support (Peters and Slovic, 1996). Individuals' values have also been shown to affect how they support certain policies since factors like party identification and political ideology have displayed a more robust relationship with people's issue preferences than their short-term self-interests (e.g. Lubell, 2002; Sears et al., 1980, p. 670; Stern et al., 1999).

The symbolic attitudes and worldviews of individuals both predict support for various policies because of how they enable individuals to perceive and react to issues. They help individuals interpret their surrounding stimuli logically, thus helping them develop opinions and attitudes. The manner in which people's attitudes and values help them process outside information and form preferences for certain policy types in particular situations is of utmost importance (e.g. Lubell, 2002; Stoutenborough et al., 2013).

Several public opinion and climate change policy studies paint the picture of how important these attitude predictors are as they can substantially raise policy support (Lipsmeyer, 2003; Timberlake et al., 2003). When reviewing opinions concerning global warming and climate change policies, I see that support for a national climate policy is strongly correlated with environmental values while opposition to a national climate policy is strongly correlated with individualism and hierarchism (Leiserowitz, 2006; Lubell et al., 2007).

While all of the criteria I discuss previously are important, it is important to keep in mind that demographic characteristics also strongly contribute to public policy choices (Lubell, 2002; Lubell et al., 2007; Pereira and Van Ryzin, 1998), though these influences can be very inconsistent (Stoutenborough et al., 2014). Even when controlling for differing attitudes and values, demographic differences are often identified (Kellstedt et al., 2008). To illustrate, Bies et al. (2013) stress that older people are more likely to support environmental policy while Li et al. (2009) emphasize that women and people with higher incomes are more likely to support the National Energy Research and Development Fund. Steel et al. (2010), also, conclude that age, gender, and education predict how people view scientists' involvement in the natural resource management process. In short, demographics are important predictors, but it is hard to predict exactly how they will influence policy preferences.

Knowledge

Knowledge is also a crucial element in the problem-solving process as people often work with little, incomplete or no information about a subject or phenomenon (Simon, 1965, 1972). As a result, it is more likely that people will make a mistake and draw wrong conclusions when acting in the policymaking arena. When confronted with a complex or uncertain issue, individuals are more likely to draw conclusions to problems with imperfect information (Ostrom, 2007). Someone must understand a problem if he or she is going to come up with appropriate solutions (Hmelo-Silver, 2004), and this is no different in the policy process where having adequate information to make informed conclusions is highly important (Baumgartner and Jones, 1993; Ostrom, 2007; Sabatier and Weible, 2007). Churchland and Sejnowski (1994) also point out that having an accurate understanding of an issue is key if the issue is tied to the survival and prosperity of our society and this is true with nuclear energy.

An individual's knowledge clearly influences his or her interpretations of issues such as nuclear energy (e.g. Stoutenborough et al., 2015). Delli Carpini and Keeter (1996) argue the degree to which the public understands an issue will determine how well the public debates it, in turn affecting what kinds of reforms may result. Thus, it is reasonable to conclude that if the public does not understand an issue very well, the government will likely be unable to represent their will (Lowi, 1979; Schumpeter, 1942). Ultimately, just like their government representatives (Ostrom, 2007), the public will likely be incapable of reaching informed conclusions and influencing policy when they misunderstand an issue (Lupia and McCubbins, 1998).

Many political scientists agree that because the public is largely unaware of the details behind scientific issues, they tend to view them differently from experts (Hansen et al., 2003; Kellstedt et al., 2008). According to the knowledge deficit model (KDM), experts better understand issues than the public, giving them the ability to see solutions that are more likely to be successful if implemented (e.g. Stoutenborough and Vedlitz, 2014; 2016). This is often seen in practice when decision-makers seek the advice of experts when enacting laws and policies. KDM assumes that experts and stakeholders will be more likely to think and act alike if the knowledge divide between the two groups diminishes. Also, per normative democracy theory, when there is a difference between citizens and the scientific community, attitudes of decision-makers will most likely mirror those of their constituents if there is a difference in understanding between the scientific community and the public (Stoutenborough and Vedlitz, 2012). Again, the role of the public in the policy process and the impact this can have if the public is not well informed about the science behind an issue is highly important in the policymaking arena (Stoutenborough et al., 2013).

If this is accurate, stakeholders and scientists should come to agree over similar policy options over time if and as people acquire more understanding about issues. Regarding nuclear energy policy, most scientists support nuclear energy because most of them believe that it is a clean, reliable, and safe alternative to fossil fuels, stressing that it should be further developed to decrease our reliance upon importing foreign oil (Intergovernmental Panel on Climate Change, 2001, 2007).

Risk and policy support

According to Olson (1965), individuals will most likely free ride without any incentive or motivation to become involved. Lubell and colleagues (2006) also stress that individuals most likely will become politically active and support policies designed specifically to address problems posing sufficient risks or benefits to them. The simplest explanation for the relationship between risk and public policy preferences is outlined by Stoutenborough and colleagues (2015,

p. 105), “those who perceive the risk associated with something as high should be more likely to oppose policies that would increase that risk, and, conversely, support policies that decrease this risk.” Many policies, like safety regulations for nuclear power plants, are the results of fears that constituents expect decision-makers to address. Consequently, understanding the role of risk perceptions is extremely important.

Perceived risk can furthermore explain why the government does not enact certain policies. Cap-and-trade policies, for example, have been employed successfully in several markets of the United States; however, they have not been used to reduce greenhouse gas emissions, notwithstanding the suggestions of scientists (Colby, 2000; Keeler, 2007). Fears of skyrocketing prices of electricity and goods, along with the possibility of changers to our standard of living, have made many people feel uneasy, thus making it almost impossible to pass cap-and-trade legislation in this country (Stoutenborough et al., 2013). Likewise, some issues like medical marijuana and use of HPV vaccines cause the public to fear what could happen in the face of negative externalities, prompting policymakers not to respond (Cohen, 2006; Hollander, 2007). In light of these findings, the public is more likely to support policies that least directly impact them when the associated risks of an issue are uncertain (Sapolsky, 1968). In this sense, any policy aimed at limiting nuclear power plant usage would be ideal.

As the above issues and the types of risks that people experience on a daily basis illustrate, different risks can be assessed differently. They are often measured with techniques that do not separate out the different aspects causing the risks (Lubell et al., 2007). Different risk-causing conditions affect specific types of risk differently (e.g. Stoutenborough et al., 2016). Therefore, it is clear that different nuclear policy risk aspects may shed more light on why people support or oppose using nuclear power as an energy source (Stoutenborough et al., 2013).

It is imperative to evaluate the various risk aspects of nuclear technology to determine how the public sees nuclear policy. Being so complex, a myriad of factors could cause concern about nuclear energy's future. The most obvious and important one, past nuclear disasters, should inform us about public risk perceptions surrounding nuclear power (Stoutenborough et al., 2013).

The Fukushima disaster is a good example because of how the incident affected numerous public attitudes. The accident resulted in several meltdowns, equipment failures, and releases of radioactive material, making it the largest nuclear disaster since Chernobyl in 1986 (Nakamura and Kikuchi, 2011). Despite not being the worst nuclear disaster to ever take place, it received a lot more media attention than previous incidents. Although most effects of the Fukushima meltdown remain unknown, it generated a high level of concern among Americans, making them apprehensive to nuclear power for the first time in many years (Nakamura and Kikuchi, 2011; Suzuki, 2017). While investigators discovered that the accident was partly due to relaxed government policies that did not properly regulate the operation and development of Japanese nuclear power (Nakamura and Kikuchi, 2011), this was not covered by the increased media attention the incident received, and likely not included in the public's interpretation of it (Stoutenborough et al., 2013).

Lastly, many other risk perceptions affect support for nuclear energy policies. Nuclear power generation produces radioactive waste, which is very dangerous if it escapes confinement. Decision-makers have attempted to decide how to handle it, bringing two risk-related concerns to the table when deliberating the issue: 1) where and how the government will store the material; and 2) how they will transport it to the place of storage. Possible risks associated with storing and transporting radioactive materials include contaminating ground water and other natural resources, and accidents occurring that release the materials into the environment (Helman, 2012; Timm and Fox, 2011).

Geographic Proximity

I will now discuss geographic proximity. This is the focus of this project because it is the least examined variable in the literature looking at public support for nuclear energy. Proximity should predict how individuals perceive issues because it exposes them to the problems. Those with greater familiarity and exposure to an issue are more likely to see it differently from those who live farther away (Mahafza et al., 2017). The reason for this is found in the risk literature, which indicates that risk is made up of four psychometric components – severity, likelihood, magnitude of harm, and expert level of understanding (e.g. Mumpower et al., 2013). Perceptions of risk are inherently knowledge-based. The better one understands an issue, the better they are able to evaluate these four components. Proximity and, thus, familiarity, are important because they will increase the likelihood that an individual will be able to better evaluate the risk associated with an issue.

Importantly, this idea plays out in the not-in-my-backyard (NIMBY) literature. For example, public support for government grant funding toward renewable energy is determined to some extent by how close stakeholders live to renewable energy sources like solar panels and wind turbines (Goldfarb et al., 2016). This idea is often emphasized in the NIMBY literature (Ansolabehere and Konisky, 2009; Firestone et al., 2009), and has been long awaited in problem definition studies (Rochefort and Cobb, 1994). However, if someone is already familiar with an issue closely aligned with NIMBY, they are less likely to fight it (Hunter and Leyden, 1995).

Researchers have made many efforts to create policy models that focus on distance analysis, most of which emphasize the impacts proximity has upon individual behaviors and problem perceptions (Tong and Chim, 2013; Brody et al., 2008; Maantay et al., 2010; Sergi and Kley, 2010). Their research implies that being close to where problems take place likely increases the public's awareness of those problems as people hear about and experience these issues more often. Because knowledge is important in the problem-solving process (Hmelo-Silver, 2004), the understanding stakeholders acquire by living close to nuclear energy sources is vital for bringing the public in favor of nuclear power.

The impact proximity has on environmental political behavior has been studied on numerous occasions. Brody and colleagues (2008), for instance, examine how proximity to locations threatened by climate change affects how the public perceives this risk. They find that how the public views climate change risk is determined in large part by proximity, with those closest to vulnerable regions more likely to see climate change as a dangerous problem (Mahafza et al., 2017). Likewise, another study concludes that proximity influences how people interpret pollution levels in creeks (Brody et al., 2004). As such, proximity to nuclear facilities may influence how individuals perceive using nuclear power to generate electricity.

The influences of proximity have been observed in several studies. Wood and Skole (1998), for instance, find that the socioeconomic behaviors of individuals who live farther away from the land plots being observed in their study could be causing environmental impacts, suggesting that people farther away from a water source may care less about water scarcity. This uncertainty shows that deciding if this idea is accurate for nuclear energy is essential because any well-informed policy decisions will be affected by this conclusion. Also, Cutter and colleagues (2003) state that geospatial information, when used in conjunction with traditional social data, paints a better picture of how vulnerable society is when natural disasters strike.

In recent years, technological and methodological advances have enabled scholars to carry out studies that better illuminate the complexities of geospatial-human relationships. By taking the connection between humans, the environment, and physical location into account (Mahafza et al., 2017), proximity to nuclear facilities may affect people's thoughts and views of nuclear power.

Chapter 3: Analytical Strategy

To understand how proximity influences support for a nuclear energy policy, I utilized data from the Institute of Science, Technology, and Public Policy National Energy Survey. The data for this study was collected between 11 May 2012 and 26 May 2012, and the poll was administered by GfK (formerly Knowledge Networks). Although collected several years ago, these data were the best available as no similar surveys had been conducted since, and I did not have the funding to carry out a large-scale survey myself. The poll randomly sampled adults across the country and resulted in 1,525 completed surveys, enabling me to determine how specific attitudes, knowledge, and risk perceptions influence policy preferences. Moreover, the survey also asked those who participated to provide their zip codes, which I used to approximate the geographic distances of the participants from their nearest nuclear power facilities, enabling me to examine how proximity affects their nuclear energy perceptions.

To test this research question, I used two models to analyze the effects of the same independent variables on two slightly different dependent variables. While both measure public support for nuclear energy, they do so in slightly different ways. The first question came from a battery of policy questions that prompted respondents with the following statement: "A number of policy options have been proposed to deal with issues associated with America's energy supply. For each policy option, please indicate whether you: strongly support, support, oppose, or strongly oppose that policy." Although they were not asked specifically in the prompt, respondents could also indicate whether they were "unsure" about their level of support or opposition to the policy option. In my case, I looked at the responses to the question analyzing the degree to which the respondents "promoted the increased use of nuclear power." The second dependent variable was derived from a second question battery that asked, "Do you favor an increase or decrease in the use of the following energy sources over the next 25 years?" Specifically, respondents were prompted with, "nuclear." There were three possible answers to this question – "increase," "decrease," and "stay the same." In both cases, the dependent variable was coded such that the lowest numerical values represented the least support for nuclear and the highest values represented the highest level of support for nuclear. Due to how the dependent variable was coded (see Table B1 for details), I used an ordered logit regression for my models because it was the most appropriate analytical tool to examine the data for both scenarios (McKelvey and Zavoina, 1995). The analyses were performed using the STATA statistics package.

To test the research question concerning the influence of proximity, two shapefiles were acquired containing the geographic locations and boundaries of all the nuclear power facilities (USGS, 2013) and zip codes (US Census Bureau, 2014) in the United States. These data were imported into ArcMap, a geographic information systems software. Consistent with previous research (e.g. Mahafza et al, 2017), respondents were assigned a location point in the centermost geographic coordinates within each zip code region. This point was used to calculate the distance between each survey participant and his or her nearest nuclear power facility. While this approach is not perfect, it is assumed that, on average, the over- and underestimation of distance for any given respondent will ultimately cancel itself out across the entire sample (see Mahafza et al., 2017).

To provide a tough test of the research question, I controlled for ten attitudinal variables in the analyses. These included environmental concerns, trust in the government, and the belief that the United States will likely face an energy shortage in the near future. The others included trust in the media, trust of expert opinion, trust in industry, trust in utility companies, trust in environmental groups, trust in the Department of Energy (DOE) and trust in the Environmental Protection Agency (EPA). Environmental issues like climate change, air and water pollution, and resource extraction are often tied to energy issues in the academic literature, meaning they need to be accounted for in the models. In general, I can expect individuals who do not trust the government to oppose implementing new government programs. This means that people who distrust the government are not likely to support using nuclear energy to generate electricity while people who trust the government are likely to do the opposite. On a final note, I can expect that respondents who perceive that an energy shortage is likely to take place in the near future will be more likely to support using additional energy sources to generate electricity, including nuclear energy (Stoutenborough et al., 2013).

Also, I controlled for the influence of five nuclear energy specific attitudes including the perceptions that nuclear energy is harmful for the environment, a safe technology, properly regulated, abundantly available and a favorably preferred energy alternative. Individuals who believe that nuclear energy is harmful for the environment should be opposed to using it to generate additional electricity, while individuals who believe it is safe should be more likely to support its usage. In addition, I can expect people who believe that nuclear energy is properly regulated and abundantly available in the United States to be more likely to support its deployment. Lastly, if constituents favor nuclear energy over other energy sources, they should be more likely to support expanding it (Stoutenborough et al., 2013).

Although the survey did not include an entire battery of questions dedicated to nuclear energy, there is a battery of general energy knowledge. Per the KDM, individuals that know more about energy issues will be more likely to support nuclear energy as it is strongly supported by the scientific community (Stoutenborough et al., 2013). Also, one question prompted respondents to rate themselves on how well they were informed on nuclear energy, which is another indicator of how much they know about this energy source.

Next, I examined the influence of risk perceptions on support for nuclear policy. There are many unknowns concerning nuclear energy that could potentially cause catastrophic damage contaminating land, water, and living organisms for thousands of miles around lasting for thousands of years (McKie, 2011; Macalister and Carter, 2009). While most of these risks can be mitigated with proper tactics, people might perceive nuclear energy as too dangerous to merit continued investment. Here, I examined three components of nuclear energy risk including how the public perceives the risk of a nuclear meltdown, nuclear waste storage, and transporting the waste. While policymakers often pass regulations to limit risks perceived by the public, nuclear energy is different because any accidents involving these three factors could seriously weaken the public's image of nuclear power.

Finally, to make sure basic demographic and political characteristics do not bias our results, it is important to account for them in the models. Consequently, I controlled for education, race, marital status, political ideology, party identification, gender, and church attendance to ensure that these characteristics do not influence the estimation of the other variables.

Chapter 4: Results

My examination of how geographic proximity and the other indicators influence public support for nuclear energy is presented below. I begin by discussing the model examining the determinants of promoting nuclear energy use, and then turn my attention to the model looking at the public's desire for increasing or decreasing nuclear energy production over the next 25 years. I will point out that the models arrive at very different conclusions and note that these differences are probably due to the different natures of the survey questions. This likely causes participants to interpret the questions differently and react to them in different ways.

Public Support for Promoting Nuclear Energy

The determinants of geographic proximity and the other four indicators influencing public support for promoting the use of nuclear energy can be found in the leftmost column of Table A1 (see Appendix A). The analysis indicates that none of our ten attitudinal indicators produce any statistically significant results. Each of these indicators—trust in government, environmental concerns, the belief that there is likely to be an energy shortage, trust in the media, trust of expert opinion, trust in industry, trust in utility companies, trust in environmental groups, trust in the DOE and trust in the EPA—fail to meet an accepted level of significance of 0.05. Hence, the model reveals that these indicators do not appear to influence public support for promoting nuclear energy use in the United States.

Four of the five nuclear energy related attitudinal indicators were found to be predictors of policy support for nuclear power. The indicators regarding whether or not people believe that nuclear energy is harmful for the environment, safe, properly regulated, and their preferred form of energy all achieve a sufficient level of statistical significance but the belief that nuclear energy is abundant does not. Therefore, individuals who believe that nuclear energy is harmful for the environment appear less likely to support a nuclear energy policy while those that believe nuclear energy is safe, properly regulated, and their preferred form of energy appear more likely to support its usage. Believing that nuclear energy is abundant appears to have no effect on the likelihood of nuclear energy support.

The model also shows that knowing about general energy sources increases the likelihood that an individual will support a nuclear energy policy while being informed about nuclear energy specifically will have no effect on public support for nuclear energy. Hence, people who know more about general energy sources are more likely to support a nuclear energy policy. People who know more about nuclear energy in particular, on the other hand, are not more or less likely to support such a policy.

The analysis further reveals that only one risk perception indicates policy support. The belief of a nuclear meltdown is a predictor of policy support, while the beliefs that there are high risks of disaster when storing and transporting nuclear waste are not. Consequently, if an individual believes the risk of a nuclear meltdown is high, it will decrease the likelihood of supporting a nuclear policy. At the same time, concerns over whether there is a high risk of disaster when storing or transporting nuclear waste appear to have no effect on public support for promoting nuclear energy.

In addition, the model indicates that geographic proximity is not a predictor of nuclear policy support. Thus, it appears to have no effect on nuclear energy support in this scenario. According to these findings, it does not matter if an individual lives closer to or farther away from a nuclear power facility as he or she will not be more or less likely to support a nuclear energy policy.

Finally, the analysis reveals that being female negatively predicts public support for a nuclear energy policy. This means that being female makes someone less likely to support promoting nuclear energy, and being male makes an individual more likely to promote nuclear power.

Support for Expanding Nuclear Power Over Next 25 Years

I will now discuss the model examining public support for increasing nuclear energy over the next 25 years, the results of which can be found in the rightmost column of Table A1 (see Appendix A). The model indicates that people who trust utility companies are more likely to support additional nuclear power over the specified time frame while the other factors appear to have no influence on the issue.

Like before, four of the five nuclear energy related attitudinal indicators were found to be significant predictors of support for increasing nuclear energy use over the specified timeframe, although the specific indicators vary from the previous model. The variables measuring whether or not people believe that nuclear energy is harmful for the environment, safe and their preferred form of energy achieve statistical significance as they did previously. However, this time the belief that nuclear energy is abundant does achieve statistical significance while the belief that nuclear energy is properly regulated is found to be insignificant. Therefore, in the second scenario, people who believe nuclear energy is harmful for the environment appear less likely to support expanding nuclear energy use, while those who believe nuclear energy is abundantly available, safe, and their preferred form of energy appear more likely to support nuclear energy expansion. Believing that nuclear energy is properly regulated ultimately appears to have no effect in this case.

The indicators of energy knowledge and being informed about nuclear energy, in continuation, were both determined to not be significant predictors of support for expanding nuclear energy since they do not achieve a sufficient level of statistical significance. This means that being informed about energy generally as well as being specifically informed about nuclear power does not appear to have any influence on public support for increasing or decreasing nuclear energy use over the next 25 years.

Moreover, just like the last model, the belief that a nuclear meltdown is likely to occur is shown to negatively predict support for expanding nuclear energy while the beliefs that there are high risks of disaster when storing and transporting nuclear waste are determined to not be significant. Consequently, believing there is a risk of a nuclear meltdown appears to make someone more likely to support additional nuclear power. Likewise, believing there are high risks of disaster when storing or transporting nuclear waste appear to have no effect on public support for increasing nuclear power use over the next 25 years.

Additionally, geographic proximity is determined to be significant when measuring support for expanding nuclear energy over the next quarter century. That is, it appears to have a negative effect on the desire for additional nuclear energy over the specified time frame, meaning the farther away one lives from a nuclear power facility the more likely he or she is to oppose nuclear energy expansion.

Finally, the model reveals that education level and being white negatively predict support for nuclear energy expansion over the next 25 years. This means that those with more education and who are white are less likely to support the increased use of nuclear power over the next quarter century.

Chapter 5: Discussion

Throughout this study, my endeavor has been to understand how geographic proximity to nuclear power facilities, in conjunction with other theoretical perspectives commonly explored in the political science literature, influences public support for using nuclear energy in the United States. I juxtaposed two slightly different ways of measuring nuclear policy support to get a sense of how people view nuclear power and include proximity and other important theoretical perspectives in the discussion. From this analysis, a few interesting discoveries come to light.

First, when I examine the general attitudinal indicators of both models, I see that no indicators are significant in the first scenario while only one indicator—trust in utility companies—appears to significantly predict support for expanding nuclear power in the latter case. Although it is not surprising that trust in utility companies would predict support for nuclear power expansion in the second situation—since the amount of trust people put in their energy providers likely indicates whether they think along the same lines as each other—it is surprising that none of the other indicators predict policy support here as trust and attitude are major factors influencing public opinion in many studies (e.g. Lubell et al., 2002; Stoutenborough et al., 2013). The same holds true for the first model, and it is even more interesting that when thinking about promoting nuclear power in general that trust in utility companies is determined to not significantly predict nuclear energy support. Except for the utility company indicator in the second scenario, these findings completely contradict what other studies tell us about general attitudes and trust (e.g. Stoutenborough et al., 2014; Goldfarb et al., 2016), implying these factors do not influence support for promoting nuclear energy or expanding it over the next quarter century when accounting for geographic proximity. This means that proximity is an important variable in public opinion studies regarding nuclear power and that attitude and trust may not be as significant as previously thought when measuring support for nuclear energy. This also indicates that people perceive nuclear energy differently if a specific timeline is attached. Trust in utility companies is not important when measuring support for promoting increased nuclear power in general. On the contrary, trust in utility companies is important for measuring nuclear expansion support over the next 25 years. This suggests that people may feel either more comfortable with nuclear energy if there is no specific timeline attached or that they are more convinced that something will happen when there is a timeline, meaning that trusting utility companies to do what is right for their customers is the best thing to do.

My examination of the specific attitudes toward nuclear energy, on the contrary, yielded different results as several predictors were determined to be significant in both models. This is more in line with what we should expect in both cases, since the beliefs that nuclear energy is harmful for the environment, safe and a preferred form of energy should influence public support for nuclear energy to some degree. This is consistent with the findings discussed in my literature review, as people are more likely to support a program that they perceive as beneficial and oppose one they perceive as risky. It is interesting to see that the belief that nuclear energy is abundant does not appear to influence support for promoting nuclear power in the first scenario while it does in the second scenario. Likewise, I can be curious as to why the belief that nuclear energy is properly regulated does not appear to influence support for nuclear power expansion in the second scenario but does predict policy support in the first scenario. These differences highlight the impact that context can have on people's perceptions of nuclear power, implying that nuclear energy specific attitudes can vary depending on whether it is clear if something will happen to increase nuclear power.

My results regarding general energy knowledge and being informed specifically about nuclear energy show that one indicator, general energy knowledge, is significant in the first model but that neither is significant in the second model. It is not surprising that nuclear energy knowledge is not significant in either instance as perceived knowledge has been demonstrated to be unrelated to actual assessed knowledge (Stoutenborough and Vedlitz, 2014), meaning people think they are more informed than they really are. However, the fact that general energy knowledge is significant in one instance but not in another is an additional sign that context plays an important role in how people perceive nuclear energy. It is evident here that being informed about energy in general is influential if nothing is certain to occur for creating additional nuclear power facilities, yet this factor is not influential in the latter case. Again, nuclear energy support depends on what the public perceives will happen.

In continuation, my findings on risk perceptions reveal that only concerns about a nuclear meltdown yield significant results in both models. Concerns about whether accidents from transporting and storing nuclear waste are likely to occur are determined to have no influence on public support for nuclear policy support in both scenarios. The first finding is not surprising as we can expect fear of a nuclear meltdown to lead to opposition to deploying nuclear power. However, it is surprising that concerns about an accident occurring from transporting and storing nuclear waste do not predict nuclear support in either case since this is contrary to what other studies say. Perhaps people are more aware of the unlikelihood of an accident occurring when transporting and storing nuclear waste than previously determined, making these indicators less important when measuring nuclear support.

Next, our examination of the effects of geographic proximity on public support for nuclear energy shows that proximity does not affect nuclear policy support in a general sense while it does when measuring support for expanding nuclear energy over the next 25 years. These conclusions completely contradict each other and reveal that context matters when thinking about nuclear power. In the first scenario, proximity appears to have no impact on nuclear policy support, meaning those living farther away could be just as likely as those living near a nuclear plant to support promoting nuclear energy. However, when considering whether to expand nuclear production over a specific time frame, individuals residing farther away from nuclear power facilities probably will not support nuclear energy growth while those who reside closer to nuclear plants will likely support building new facilities. Here, it is clear that people that live far away from nuclear sites will probably be afraid of nuclear energy and not completely understand the safety features and advantages of this energy source since they are not exposed to it often and only know what they hear from their friends, family members and news sources. This finding supports the NIMBY literature, which states that individuals with no nuclear plants in their vicinity will most likely not want a new facility constructed nearby. Those who reside closer to nuclear facilities, on the other hand, will most likely view nuclear energy as a safe, sustainable, effective and efficient option for sustainably increasing energy production in the United States since they hear about the benefits of nuclear power from local outreach programs and experience these things for themselves. These findings suggest that, when thinking about increasing nuclear power in general, people give little thought to the matter because nothing is sure to happen. According to this logic, they have no reason to fear the risks associated with using more nuclear energy as things will likely go unchanged. In the latter case, individuals who do not correctly understand the safety features and benefits of nuclear power have numerous reasons to fear its risks, and unfortunately it is harder for those who live farther away from nuclear facilities to obtain accurate information since there are likely no experts or community outreach programs nearby to answer their questions. Ultimately, the answer to whether proximity plays a role in public support for nuclear energy is ambiguous and depends on the context of the situation.

Finally, after reviewing the different results between the two models, they appear inconsistent with one another, indicating that the two survey questions I use to measure the dependent variables, although similar, capture two fundamentally different concepts. The first question apparently leads the participants to think of the government being responsible for increasing nuclear power. The second question, on the other hand, seems to give participants the idea that something will happen, and anyone could be responsible for increasing nuclear power over the next quarter century. This is due to how the survey questions are structured. The word "promote" in the first case gives the impression of the government being in charge, while the timeline proposed in the second case gives many different impressions of possible actions and responsible parties. These differences likely lead to perceptions of nuclear power since people tend to feel more secure about a proposed action or policy when the government is involved, and less secure when another entity is in charge. These different lines of thinking clearly impact how people view nuclear power as an energy source, which likely explains why I obtained different results between my models.

Chapter 6: Conclusions

These findings highlight the importance of proximity and the other theoretical perspectives in generating support for nuclear energy. The importance of context is also stressed throughout. To determine if proximity plays a role in nuclear policy support, it needs to be very clear to people that something is going to be done to increase nuclear power and that someone will be responsible for the actions taken. If the government appears involved, people seem to feel safer, and proximity is not as important. If another entity appears to be in charge, proximity is an important indicator of public support for nuclear energy and nuclear energy advocates will need to reach out to individuals residing farther away from nuclear power sites to generate support for this energy source in those areas. This is essential to generate enough support for the government to consider investing in nuclear power, because for the time being it does not seem that enough people support nuclear energy to warrant deploying it on a large scale. Reaching out to these groups and establishing momentum for building support will take time but can ultimately be done if the right effort is made. Lastly, when accounting for proximity, other theoretical perspectives previously determined to be significant might not be as important as previously thought, and future research on this and other public opinion topics should account for proximity in their models to reach accurate conclusions.

Appendix A

Table A1. The effects of proximity on public support for nuclear energy in the United States.

	Promote Nuclear Energy		Expand Nuclear Energy	
	Coefficient	Prob.	Coefficient	Prob.
Proximity				
Distance	$1.22e^{-7}$ ($2.47e^{-7}$)	0.621	$-5.82e^{-7}$ ($2.47e^{-7}$)	0.019
Attitudes Indicators				
Environmental Concern	0.016 (0.032)	0.628	0.018 (0.031)	0.553
Trust Government	-0.154 (0.105)	0.142	0.106 (0.098)	0.281
Energy Shortage	0.031 (0.029)	0.293	0.047 (0.028)	0.087
Trust Media	0.025 (0.045)	0.568	-0.004 (0.039)	0.919
Trust Experts	-0.019 (0.057)	0.742	-0.053 (0.050)	0.284
Trust Industry	-0.010 (0.049)	0.842	-0.064 (0.048)	0.180
Trust Utilites	0.008 (0.005)	0.125	0.011 (0.005)	0.038
Trust Env. Groups	-0.007 (0.004)	0.118	-0.004 (0.004)	0.377
Trust DOE	0.010 (0.009)	0.282	0.006 (0.008)	0.496
Trust EPA	-0.001 (0.008)	0.887	-0.001 (0.007)	0.887
Nuclear Abundant	0.193 (0.113)	0.088	0.230 (0.107)	0.031
Nuclear Regulated	0.294 (0.106)	0.006	0.192 (0.099)	0.053
Nuclear Favored	0.395 (0.050)	0.000	0.382 (0.053)	0.000
Nuclear Harmful	-0.465 (0.076)	0.000	-0.509 (0.078)	0.000
Nuclear Safe	0.724 (0.117)	0.000	1.180 (0.123)	0.000
Knowledge				
Energy Knowledge	0.877 (0.378)	0.020	0.274 (0.346)	0.429
Informed Nuclear	0.017 (0.028)	0.540	-0.007 (0.027)	0.789
Risk Perceptions				
Meltdown	-0.069 (0.033)	0.040	-0.101 (0.030)	0.001
Storage	-0.042 (0.044)	0.339	-0.038 (0.040)	0.334
Transportation	0.008 (0.044)	0.859	0.029 (0.040)	0.471
Demographics				
Sex	-0.420 (0.134)	0.002	-0.160 (0.121)	0.187
Attend Church	-0.136 (0.148)	0.359	-0.118 (0.135)	0.381
Education	0.035 (0.025)	0.148	-0.047 (0.023)	0.040
Race	0.158 (0.164)	0.335	-0.374 (0.159)	0.019
Marital Status	0.114 (0.132)	0.386	-0.037 (0.121)	0.758
Ideology	0.033 (0.059)	0.580	-0.044 (0.058)	0.452
Party ID	0.081 (0.065)	0.212	0.102 (0.058)	0.078
Cut Point 1	0.097 (0.648)		-2.927 (0.650)	
Cut Point 2	1161		1153	
Number of Cases				
Wald Chi^2	482.27	0.0000	554.75	0.0000
Log Pseudolikelihood	-879.4454		-1285.5771	
McFadden's R^2	0.302		0.265	

Robust standard errors in parenthesis. Two-tailed test.

Appendix B

Table B1
Variable definitions.

Dependent variable	
Increase nuclear power	Measured using a 5-point scale. Respondents were asked, “A number of policy options have been proposed to deal with issues associated with America’s energy supply. For each policy option, please indicate whether you: strongly support, support, oppose, or strongly oppose that policy.” “Promote the increased use of nuclear power.” Coded in order from 0 = “strongly oppose” to 4 = “strongly support”
Increase nuclear power over the next 25 years	Measured using a 3-point scale. Respondents were asked, “Do you favor an increase or decrease in the use of the following energy sources over the next 25 years?” “Nuclear.” Coded as, 0 = “decrease,” 1 = “stay the same,” and 2 = “increase”
Proximity	
Distance	Measured in meters
Attitudinal Indicators	
Environmental Concern	Measured using an 11-point scale. Respondents were asked, “On a scale from 0 to 10, with 0 indicating not at all concerned and 10 indicating extremely concerned, how concerned are you about each of the following issues?” “The environment.” (Recoded such that 0-1=1, 2-3=1, 4-6=2, 7-8=3, 9-10=4)
Trust Government	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust the federal government in Washington, D.C. to do what is right?” Coded as, 0 = “rarely,” 1 = “only some of the time,” 2 = “most of the time,” and 3 = “just about always”
Energy shortage	Measured using an 11-point scale. Respondents were asked, “On a scale from 0 to 10, with 0 indicating not at all likely and 10 indicating extremely likely, what is the likelihood of the United States facing a critical energy shortage in the next 10 years?” (Recoded such that 0-1=1, 2-3=1, 4-6=2, 7-8=3, 9-10=4)
Trust Experts	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust scientific experts to promote what is right?” Coded as, 0 = “rarely,” 1 = “only some of the time,” 2 = “most of the time,” and 3 = “just about always”
Trust Industry	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust industry to do what is right?” Coded as, 0 = “rarely,” 1 = “only some of the time,” 2 = “most of the time,” and 3 = “just about always”
Trust Utilites	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust utility companies to do what is right?” Coded as, 0 = “rarely,” 1 = “only some of the time,” 2 = “most of the time,” and 3 = “just about always”
Trust Env. Groups	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust environmental groups to advocate for what is right?” Coded as, 0 = “rarely,” 1 = “only some of the time,” 2 = “most of the time,” and 3 = “just about always”
Trust DOE	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust the U.S. Department of Energy to do what is right?” Coded as, 0 = “rarely,” 1 = “only some of the time,” 2 = “most of the time,” and 3 = “just about always”
Trust EPA	Measured using a 4-point scale. Respondents were asked, “How much of the time do you think you can trust the Environmental Protection Agency to do

	what is right?" Coded as, 0 = "rarely," 1 = "only some of the time," 2 = "most of the time," and 3 = "just about always"
Nuclear Abundant	Measured using a 3-point scale. Respondents were asked, "This energy source is abundantly available." "Nuclear." Respondents were presented with the following answer choices: "True" = 2, "Unsure" = 1, and "False" = 0
Nuclear Regulated	Measured using a 3-point scale. Respondents were asked, "This energy source is sufficiently regulated by the government." "Nuclear." Respondents were presented with the following answer choices: "True" = 2, "Unsure" = 1, and "False" = 0
Nuclear Favored	Measured using a 6-point ranking scale. Respondents were asked, "Please rank these electric energy sources from your most favored (1) to least favored (6)." "Nuclear"
Nuclear Harmful	Measured using a 5-point scale. Respondents were asked, "Some ways of generating electricity may be harmful to the environment because they produce air pollution, water pollution, or toxic wastes. How harmful to the environment do you think each of these electrical power sources is?" "Nuclear." Coded in order from 0 = "not at all harmful" to 4 = "very harmful"
Nuclear Safe	Measured using a 3-point scale. Respondents were asked, "This energy source is safe." "Nuclear." Respondents were presented with the following answer choices: "True" = 2, "Unsure" = 1, and "False" = 0
Knowledge	
Energy Knowledge	Measured as an index that averaged the number of correct answers to a 9-question battery. Respondents were asked, "Please decide if each of these statements are true or false." (1) "The U.S. is NOT the largest per capita energy consumer in the world;" (2) "Refrigerators account for 7% of the nation's energy use;" (3) "Wind power accounts for 10% of the electricity currently generated in the United States;" (4) "An odor must be added to natural gas for safety purposes;" 5) "Coal accounts for less than 20% of the electricity currently generated in the United States;" (6) "Electricity produced by coal, natural gas, nuclear, and oil relies upon heat to turn water into steam to spin large turbines, which generate the electricity;" (7) "One fingertip sized uranium pellet produces roughly the same amount of energy as 150 gallons of oil;" (8) "Renewable energy sources, like wind and solar, receive government subsidies or tax incentives, but conventional energy, like coal and natural gas, do not;" and (9) "Conditions along much of the coastline of the United States are well suited for wind energy"
Informed Nuclear	Measured using a 5-point scale. Respondents were asked, "Please indicate how familiar you are with the following energy sources?" "Nuclear." Coded in order from 0 = "Not at all familiar" to 4 = "Very familiar"
Risk Perceptions	
Meltdown	Measured using an 11-point scale. Respondents were asked, "We are interested in assessing your level of concern regarding various issues associated with energy generation. Using a scale from 0 to 10, with 0 indicating not at all concerned and 10 indicating extremely concerned, what is your level of concern for the following?" "Nuclear meltdown." (Recoded such that 0-1=1, 2-3=1, 4-6=2, 7-8=3, 9-10=4)
Storage	Measured using an 11-point scale. Respondents were asked, "We are interested in assessing your level of concern regarding various issues associated with energy generation. Using a scale from 0 to 10, with 0 indicating not at all concerned and 10 indicating extremely concerned, what is your level of concern for the following?" "The Storage and Disposal of Nuclear Waste." (Recoded such that 0-1=1, 2-3=1, 4-6=2, 7-8=3, 9-10=4)
Transportation	Measured using an 11-point scale. Respondents were asked, "We are interested in assessing your level of concern regarding various issues

	associated with energy generation. Using a scale from 0 to 10, with 0 indicating not at all concerned and 10 indicating extremely concerned, what is your level of concern for the following?" "The transportation of Nuclear Waste to a Storage Facility." (Recoded such that 0-1=1, 2-3=1, 4-6=2, 7-8=3, 9-10=4)
Demographics	
Sex	Measured nominally as 0 = male, and 1 = female
Attend Church	Measured nominally as 0 = no, 1 = yes
Education	Measured in years of education
Race	Measured nominally as 1 = white, and 0 = nonwhite
Marital Status	Measured nominally as 1 = married, and 0 = not married
Ideology	Measured as a 7-point scale, with 1 = strongly liberal, and 7 = strongly conservative
Party ID	Measured as a 5-point scale, with 1 = strong Democrat, and 5 = strong Republican

Appendix C

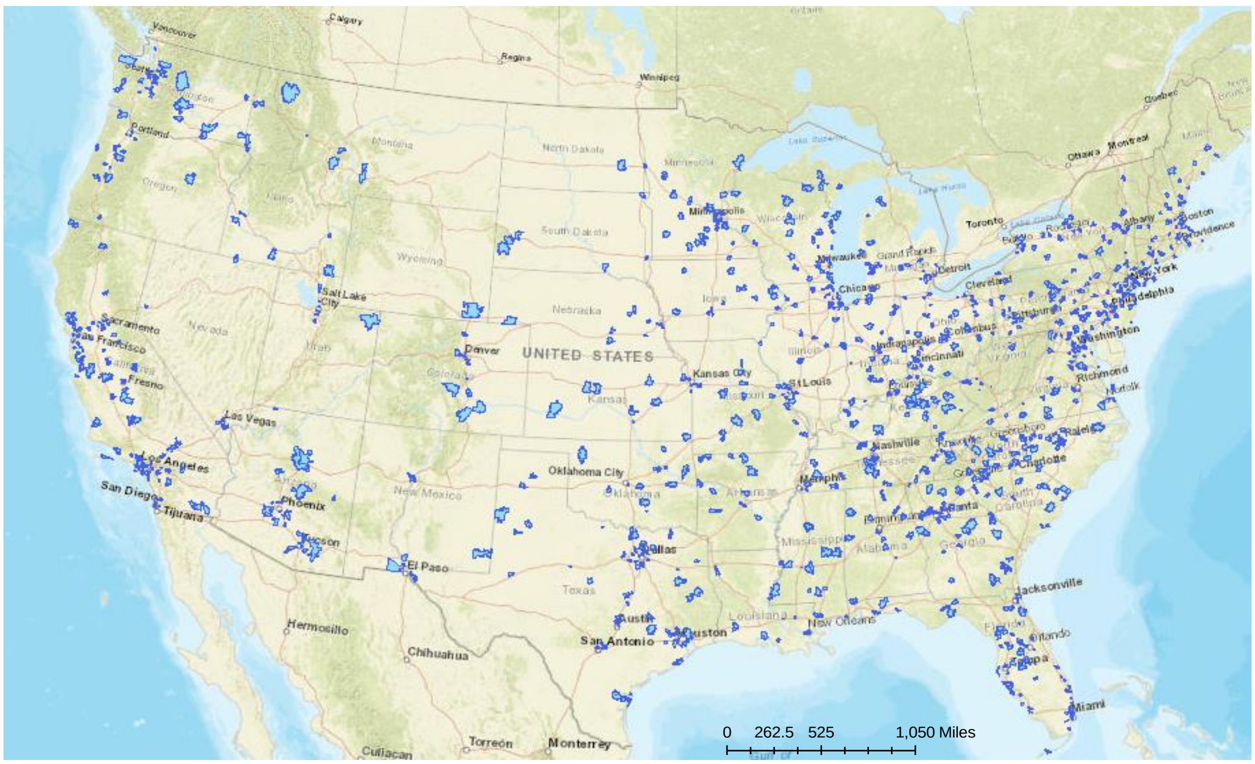

Figure C1. Zip code boundaries (in blue) of survey respondents.

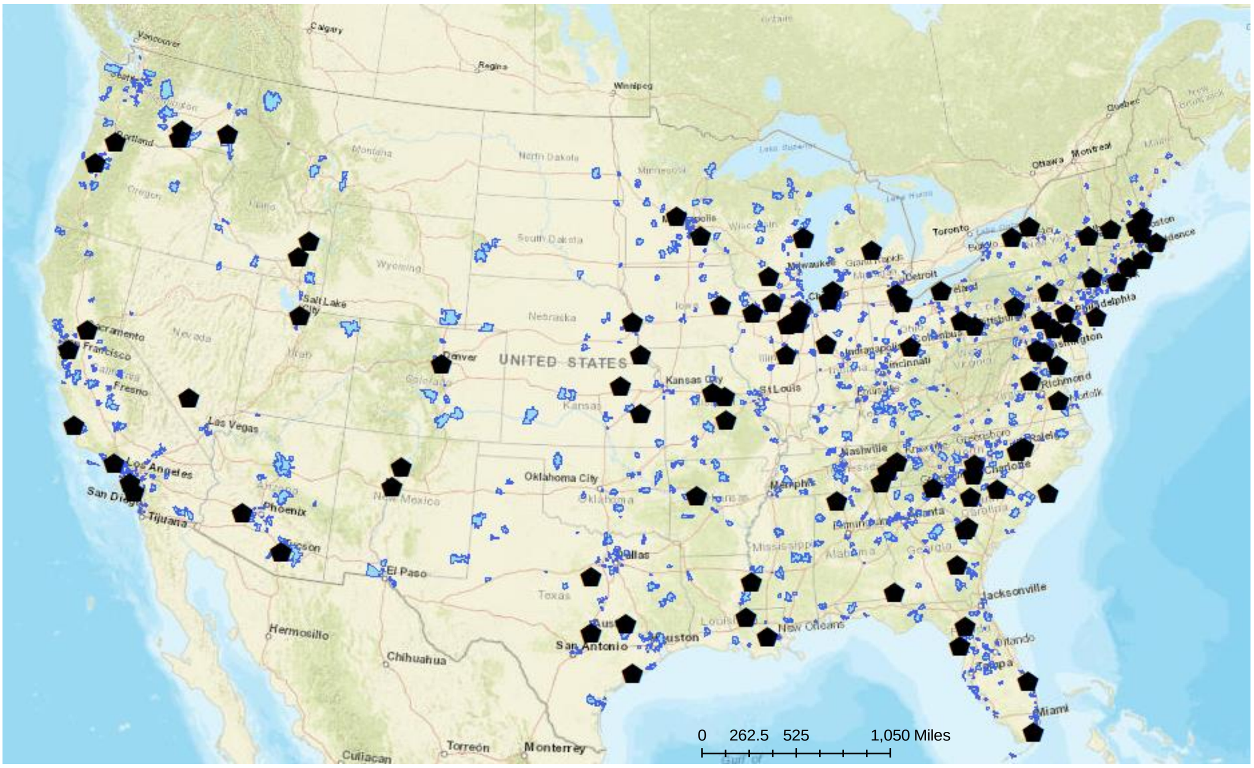

Figure C2. Nuclear power facility locations (black hexagons) and proximities to zip code boundaries (in blue).

References

Ansolabehere, S., Konisky, D. M., 2009. Public attitudes toward construction of new power plants. Public Opinion Quarterly 73 (3), 566–577.

Baumgartner, F.R., Jones, B.D., 1993. Agendas and Instability in American Politics. University of Chicago Press, Chicago.

Bies, A, Lee, D.G., Lindsey, C., Stoutenborough, J.W., Vedlitz, A., 2013. Citizens, Nonprofits and Climate Change Policy. Nonprofit Policy Forum 4 (1), 5-28.

Brody, S., Highfield, W., Alston, L., 2004. Does location matter? Measuring environmental perceptions of creeks in two San Antonio watersheds. Environment & Behavior 36 (2), 229–550.

Brody, S. D., Zahran, S., Vedlitz, A., Grover, H., 2008. Examining the relationship between physical vulnerability and public perceptions of global climate change in the United States. Environment & Behavior 40 (1), 72–95.

Churchland, P.S., Sejnowski, T.J., 1994. The Computational Brain. MIT Press, Cambridge, MA.

Cohen, P.J., 2006. Medical marijuana, compassionate use, and public policy: expert opinion or VoxPopuli? The Hastings Center Report 36 (3), 19–22.

Colby, B.G., 2000. Cap-and trade policy challenges: a tale of three markets. Land Economics 76 (4), 638–658.

Cutter, S. L., Boruff, B. J., Shirley, W., 2003. Social vulnerability to environmental hazards. Social Science Quarterly 84 (2), 242–261.

Dake, K., 1991. Orienting dispositions in the perception of risk: an analysis of contemporary worldviews and cultural biases. Journal of Cross-Cultural Psychology 22, pp. 61-82.

Delli Carpini, M.X., Keeter, S., 1996. What Americans Know about Politics and Why it Matters. Yale University Press, New Haven, CT.

Firestone, J., Kempton, W., Krueger, A., 2009. Public acceptance of offshore wind power projects in the USA. Wind Energy 12 (2), 183–202.

Goldfarb, J.L., Buessing, M., Kriner, D.L., 2016. Geographic proximity to coal plants and U.S. public support for extending the Production Tax Credit. Energy Policy 99, 299–307.

Hansen, J., Holm, L., Frewer, L., Robinson, P., Sandøe, P., 2003. Beyond the knowledge deficit: recent research into lay and expert attitudes to food risks. Appetite 41 (2), 111–121.

Harvey, F., 2011. Nuclear is the Safest Form of Power, Says Top UK Scientist. Guardian, March 29. Available: <http://www.guardian.co.uk/environment/2011/mar/29/nuclear-power-safe-sir-king-david> [accessed December 21, 2018]

Helman, C., 2012. Nuke us: The Town that Wants America's Worst Atomic Waste. Forbes, January 25. Available: <http://www.forbes.com/sites/christopherhelman/2012/01/25/nuke-us-meet-the-town-that-wants-americas-worst-nuclear-waste/> [accessed December 23, 2018]

Hmelo-Silver, C. E. (2004). Problem-based learning: what and how do students learn? Educational Psychology Review 16 (3), 235–266.

Hollander, D., 2007. Many pediatricians are reluctant to vaccinate young females against human papillomavirus. Perspectives on Sexual and Reproductive Health 39 (2), 121–122.

Hunter, S, Leyden, K., 1995. Beyond NIMBY: explaining opposition to hazardous waste facilities. Policy Studies Journal 23, 601– 619.

Intergovernmental Panel on Climate Change, 2001. Climate Change 2001: Mitigation. Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change, 2001. Cambridge University Press, New York.

Intergovernmental Panel on Climate Change, 2007. Climate Change 2007: Mitigation of Climate Change. Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change, 2007. Cambridge University Press, New York.

Keeler, A.G., 2007. State greenhouse gas reduction policies: a move in the right direction? Policy Sciences 40 (4), 353–365.

Kellstedt, P.M., Zahran, S., Vedlitz, A., 2008. Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. Risk Analysis 28 (1), 113–126.

Li, H., Jenkins-Smith, H.C., Silva, C.L., Berrens, R.P., Herron, K.G., 2009. Public support for reducing US reliance on fossil fuels: investigating household willingness-to-pay for energy research and development. Ecological Economics 68 (3), 731–742.

Leiserowitz, A., 2006. Climate change risk perception and policy preferences: the role of affect, imagery, and values. Climatic Change 77, pp. 45-72.

Lipsmeyer, C.S., 2003. Welfare and the discriminating public: evaluating entitlement attitudes in post-communist Europe. Policy Studies Journal 31 (4), 545–564.

Lowi, T., 1979. The End of Liberalism: The Second Republic of the United States. W. W. Norton & Co., New York.

Lubell, M., 2002. Environmental activism as collective action. Environment and Behavior 34 (4), 431.

Lubell, M., Vedlitz, A., Zahran, S., Alston, L.T., 2006. Collective action, environmental activism, and air quality policy. Political Research Quarterly 59 (1), 149–160.

Lubell, M., Zahran, S., Vedlitz, A., 2007. Collective action and citizen responses to global warming. Political Behavior 29 (3), 391–413.

Lupia, A., McCubbins, M.D., 1998. The Democratic Dilemma: Can Citizens Learn What They Need to Know?. Cambridge University Press, Cambridge, UK.

Maantay, J., Chakraborty, J., Brender, J., 2010. Proximity to Environmental Hazards: Environmental Justice and Adverse Health Outcomes. In: Strengthening Environmental Justice Research and Decision Making: A Symposium on the Science of Disproportionate Environmental Health Impacts, US Environmental Protection Agency, Washington, DC. March 17–19. Available: <http://archive.epa.gov/ncer/ej/web/pdf/maantay.pdf> [Accessed: January 27, 2019]

Macalister, T., Carter, H., 2009, May 12. Britain's Farmers Still Restricted by Chernobyl Disaster Fallout. Guardian. Available: <http://www.guardian.co.uk/environment/2009/may/12/farmers-restricted-chernobyl-disaster> [Accessed: January 20, 2013]

Mahafza, Z.B., Stoutenborough, J.W., Vedlitz, A., 2017. The role of proximity in problem identification: risk of water scarcity in Texas. Water Policy 19, pp. 86-98.

McKelvey, R.D., Zavoina, W., 1995. A statistical model for the analysis of ordinal level dependent variables. Journal of Mathematical Sociology 4 (1), 103-120.

McKie, R. 2011, March 26. Chernobyl 25 years on: A Poisoned Landscape. Guardian. <http://www.guardian.co.uk/world/2011/mar/27/chernobyl-disaster-anniversary-japan> (January 20, 2013).

Mumpower, J.L., Shi, L., Stoutenborough, J.W., Vedlitz, A., 2013. Psychometric and Demographic Predictors of the Perceived Risk of Terrorist Threats and the Willingness to Pay for Risk Management Programs. Risk Analysis 33 (10), 1802-1811.

Nakamura, A., Kikuchi, M., 2011. What we know, and what we have not yet learned: triple disasters and the Fukushima nuclear fiasco in Japan. Public Administration Review 71, pp. 893-899.

North American Electricity Reliability Council, 2006. 2006 Long-Term Reliability Assessment: The Reliability of the Bulk Power Systems in North America. North American Electricity Reliability Council, Princeton, NJ.

Olson, M., 1965. The Logic of Collective Action: Public Goods and the Theory of Groups. Harvard University Press, Cambridge, MA.

Ostrom, V., 2007. The Intellectual Crisis in American Public Administration, third ed. University of Alabama Press, Tuscaloosa.

Pereira, J.A., Van Ryzin, G.G., 1998. Understanding public support for time limits and other welfare reforms. Policy Studies Journal 26 (3), 398–418.

Peters, E., Slovic, P., 1996. The role of affect and worldviews as orienting dispositions in the perception and acceptance of nuclear power. Journal of Applied Social Psychology 26 (16), 1427–1453.

Robinson, S.E., Liu, X., Stoutenborough, J.W., Vedlitz, A., 2013. Explaining popular trust in the Department of Homeland Security. Journal of Public Administration Research and Theory 23, pp. 713-731.

Rochefort, D., Cobb, R. W., 1994. Problem definition: an emerging perspective. In: Problem Definition: An Emerging Perspective. Rochefort, D. & Cobb, R. W. (Eds), University Press of Kansas, pp. 1–31.

Sabatier, P.A., Weible, C.M., 2007. The advocacy coalition framework: innovations and clarifications. In: Sabatier, P.A. (Ed.), Theories of the Policy Process, second ed. Westview Press, Boulder, CO.

Sapolsky, H.M., 1968. Science, voters, and the fluoridation controversy: conflict among perceived experts leads voters to act negatively on the fluoridation innovation. Science 162 (3852), 427–433.

Schumpeter, J., 1942. Capitalism, Socialism, and Democracy. Harper, New York.

Sears, D.O., Lau, R.R., Tyler, T.T., Allen Jr., H.M., 1980. Self-interest vs. symbolic politics in policy attitudes and presidential voting. The American Political Science Review 74 (3), 670–684.

Sergi, V., Kley, S., 2010. The Geographic Proximity of Social Ties in Migration Intentions and Behavior. Working paper for Migremus: Migration, Residential Mobility and Urban Structure, Universität Bremen.

Simon, H.A., 1965. Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization. Free Press, New York, Originally published in 1947.

Simon, H.A., 1972. Theories of bounded rationality. In: McGuire, C.B., Radner, R. (Eds.), Decision and Organization: A Volume in Honor of Jacob Marschak. North Holland Publishing Company, Amsterdam, pp. 161–176.

Steel, B.S., Warner, R.L., Lach, D., 2010. Gender differences in support for scientific involvement in U.S. environmental policy. Science Technology & Human Values 35 (2), 147–173.

Stern, P.C., Dietz, T., Abel, T., Guagnano, G.A., Kalof, L., 1999. A value-belief-norm theory of support for social movements: the case of environmentalism. Human Ecology Review 6 (2), 81–97.

Stoutenborough, J.W., Bromley-Trujillo, R., Vedlitz, A., 2014. Public Support for Climate Change Policy: Consistency in the Influence of Values and Attitudes over Time and Across Specific Policy Alternatives. Review of Policy Research 31 (6): 555-583.

Stoutenborough, J.W., Vedlitz, A., 2012. Public Opinion and Climate-related Policy Solutions: A Comparison of the Policy Preferences of the Public, Stakeholders, and Climate Scientists. Presented at the Annual Meeting of the Midwest Political Science Association, Chicago.

Stoutenborough, J.W., Vedlitz, A., 2014. The effect of assessed and perceived knowledge of climate change on public policy concerns: an empirical comparison. Environmental Science and Policy 37, pp. 23-24.

Stoutenborough, J.W., Vedlitz, A., 2016. The Role of Scientific Knowledge in the Public's Perceptions of Energy Technology Risks. Energy Policy 96 (September): 206-216.

Stoutenborough, J.W., Vedlitz, A., Liu, X., 2015. The Influence of Specific Risk Perceptions on Public Policy Support: An Examination of Energy Policy. The ANNALS of the American Academy of Political and Social Science 658(1): 102-120.

Stoutenborough, James W., Vedlitz, A., Xing, X., 2016. Are all Risk Perceptions Created Equal? Comparing General Risk Assessments and Specific Risk Assessments Associated with Climate Change. Human and Ecological Risk Assessment: An International Journal 22 (1): 50-70.

Stoutenborough, J.W., Sturgess, S. G., Vedlitz, A., 2013. Knowledge, risk, and policy support: Public perceptions of nuclear power. Energy Policy 62, pp. 176-184.

Timberlake, J.M., Lock, E.D., Risinski, K.A., 2003. How should we wage the war on drugs? Determinants of public preferences for drug control alternatives. Policy Studies Journal 31 (1), 71–88.

Timm, C.M., Fox, J.V., 2011. Could WIPP replace Yucca Mountain? Nuclear Engineering International 11, 2013.

Tong, H.H.Y., Chim, D., 2013. The relationship between casino proximity and problem gambling. Asian Journal of Gambling Issues and Public Health 3 (2), 1–17.

U.S. Environmental Protection Agency, 2013. Inventory of U.S. Green House Gas Emissions and Sinks: 1990-2011.

Wildavsky, A., Dake, K., 1990. Theories of risk perception: who fears what and why? Daedalus 119 (4), 41–60.

Wood, C. H., Skole, D., 1998. Linking satellite, census, and survey data to study deforestation in the Brazilian Amazon. In: People and Pixels: Linking Remote Sensing and Social Science. Liverman, D., Moran, E. F., Rindfuss, R. R. & Stern, P. C. (Eds), National Academy Press, Washington, DC, pp. 70–93.

Geographic Information Systems Datasets

US Census Bureau (2014). 2013 TIGER/Line Shapefiles. http://www.census.gov/geo/maps-data/data/tiger-line.html (Accessed November 15 2018).

USGS (2013). Nuclear Power Plants in the United States. US Geological Society. http://nationalmap.gov/small_scale/mld/nuclplants.html (Accessed November 15 2018).