Models for Stakeholder Relationship Management at Socially Controversial Facilities

by

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Submitted to the System Design and Management Program
in partial fulfillment of the requirements for the degree of

Master of Science in Engineering and Management
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ABSTRACT

Stakeholder engagement is a key but often misunderstood performance indicator of project success in controversial projects. Construction projects, power production, medical research, and waste disposal are examples of such large-scale projects. Many of these are critical assets and yet are often at risk of being shut down due to key stakeholder disengagement. It is a tragedy when a successful and needed project is terminated not because of technical, economic, or safety issues but due to a lack of proper stakeholder engagement.

At a broad level it is generally understood that stakeholder relationship management is important, but how important and what must be done to ensure appropriate stakeholder engagement remains unclear. My research addresses this chronic problem using a newly developed system dynamics model that better illustrates complex relationships, how they change over time, and what must be done to gather enough support to ensure project success.

To firmly root the system dynamics model, interviews were done at an unnamed nuclear power plant (NPP) in the United States. The strengths and weaknesses of the NPP's public outreach efforts were enumerated along with the strengths and weaknesses of the model itself. Ultimately, the model was shown to be plausibly useful to individuals responsible for success in managing stakeholder relationship on controversial projects.

Thesis Supervisor: Michael W. Golay

Title: Professor of Nuclear Science and Engineering

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Core Chapter Summaries

Chapter 1 – Introduction

This chapter introduces the motivation behind studying controversial project stakeholder management and the specific research question. The case for seeking a better way of managing stakeholder management is discussed followed by a discussion of the research question this report answers. The factors important in answering the question are discussed as a lead-in to the following chapter on research methodology.

Chapter 2 – Literature Review and Research Methods

This chapter provides a literature review and a description of the research methods used for this report. It briefly reviews System Dynamics and the Golay-Williams stakeholder acceptance model before describing the interview process. It ends with a discussion on how the collected data was synthesized to provide answers to the research question.

Chapter 3 – Stakeholder Interviews and Model Analysis

This chapter lists the key stakeholder interview themes and whether they presented themselves in the model accurately or not. The interviews and analysis are from the stakeholders' perspective.

Chapter 4 – NPP Strategy and Engagement Cases

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Chapter 5 – Conclusion

This chapter revisits the research question asked at the beginning of this report and addresses why the work contained within is important and meaningful. It also contains an assessment of the model's utility and of the NPP's overall efforts.

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This chapter highlights issues at the state and national level that warrant further research. It also addresses the spent nuclear fuel problem within the United States.

Chapter 1 – Introduction

Stakeholder engagement is a key but often misunderstood performance indicator of project success in controversial projects. Construction projects, power production, medical research, and waste disposal are examples of such large-scale projects. Many of these are critical assets and yet are often at risk of being shut down due to key stakeholder disengagement. It is a tragedy when a successful and needed project is terminated not because of technical, economic, or safety issues but due to a lack of proper stakeholder engagement.

Part of the problem is the temporal nature of long-term projects: things change over time. Stakeholders appear and disappear and are more and less important at different phases of a project. Environments change. Staff and management change. The engineers that design a facility or program may never see it running, and those involved in the operation may retire and new staff may be hired. Politicians and local government figures will change after election cycles, and populations living near the projects may change in number, demographically, or in other ways. Events may occur that have nothing to do with the project but affect it dramatically such as how the Daiichi-Fukushima disaster affected the US power utilities.

Stakeholder engagement remains an important and misunderstood project requirement. At a broad level it is generally understood that stakeholder engagement is important and that everyone should do it. But how to do it well enough to ensure appropriate stakeholder acceptance over time remains unclear. This paper revisits this chronic problem using a newly developed system dynamics model developed at MIT called the Golay-Williams stakeholder acceptance model. The hope is that it illustrates better complex relationships, how they change over time, and what must be done to gather enough support to ensure project success. Ultimately the goal is to be able to provide this model to persons responsible for public outreach of controversial projects in order to help drive better success rates.

1.1 Motivation

The Golay-Williams model rests upon the notion that stakeholder engagements across projects have similar challenges. Instead of having a different approach invented each time that a new project needs to engage stakeholders, the Golay-Williams model can instead be used to provide a standardized, reasoned model which draws upon many years of research. The technical details will be different between projects but the model provides a framework from which to understand stakeholder dynamics.

Anytime you...

1. have something complex, controversial, and technical
2. affect a large heterogeneous group of people
3. involve the US political system

...you must come up with a way to address stakeholder engagement.

Another underlying notion to the Golay-Williams model is that project success is based on stakeholder acceptance. In other words, stakeholder acceptance is a differentiating factor between successful projects and failures. Sometimes a better stakeholder relationship results in improved safety and performance because the project reacts to concerns raised by stakeholders when it ordinarily wouldn't engage on its own. Two recent disasters could have been avoided had there been better public outreach efforts.

1.1.1 A Recent Major Project Failure

On August 5th 2015, United States Environment Protection Agency (EPA) personnel and contractors spilled 3 million gallons of toxic elements into Colorado rivers. They were trying to stem leaking mine water from an abandoned gold mine which was going into a nearby creek [1], [2]. The EPA has been heavily criticized for the incident and for their response, especially for not providing notification to key agencies for at least 24 hours after the spill [3]. The nearby rivers turned orange due to pollutants and they have been closed indefinitely due to high levels of toxicity [4]. The disaster could cost taxpayers as much as $28 billion in cleanup cost based on the government's own analysis. The damage to the EPA's reputation is significant and the worst part is that the EPA's other projects may be affected. If the

organization's abilities are now restricted, the mission that they are trying to perform of providing environmental protection and government oversight will suffer. This means that beyond the Colorado accident, the population that the EPA serves is much worse off than if proper stakeholder engagement had occurred before the spill. It is documented that they were warned repeatedly of the risks and that another similar incident happened 5 months earlier in Georgia [5].

This is a clear example of a failure by an organization to engage appropriately in stakeholder relationship management. Obviously there are other factors at play other than just stakeholder engagement that contributed to this incident but the omission of proper engagement is clear. It is important to note several things that are constant across controversial projects:

1. Large-scale complex controversial projects can have disastrous consequences.
2. Such projects typically have significant underlying value that satisfy a strong need or they wouldn't be attempted.
3. Stakeholder management can help make such projects more successful.
4. Stakeholder engagement is not a panacea. It won't fix all problems.
5. Stakeholder engagement, like safety, is not a transient or episodic activity. It must be done continuously for the duration of the project.

1.1.2 Nuclear Power in the United States

In 2014 the United States used nuclear power for approximately 20% of its total electrical output. 99 units are operational and five are under construction [6]. Worldwide, as shown in Fig. 1, France and Belgium lead in terms of percentage of nuclear power [7].
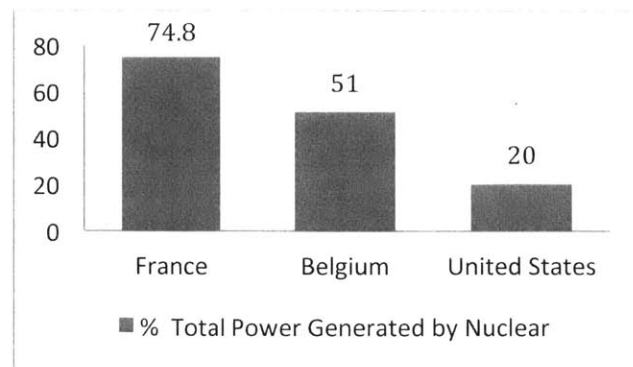
Figure 1 - Nuclear Power Generation as a Percentage of Total Country Power Generation

Social factors, such as the fact that France has the best implementation of nuclear power due to a centralized government utility, are probably why that country and others lead in terms of nuclear power generation. Because of the awkward and lengthy approval process for nuclear projects in the US, there is a chilling effect on investors and regulators. As a result, stakeholders are difficult to manage but critical to a project's success. While the public trust of the nuclear power industry is the lowest of any power industry, opinions may shift if there are more opportunities due to growing demand in the energy sector for carbon free base load [7].

There are several unique factors regarding nuclear power in the United States.

Factor 1: It is a critical base load power source with high energy density.

Base load power sources are power sources that can consistently generate minimum demand [8]. With its strong energy density, nuclear power plants do not require a large amount of space to produce strong, consistent, baseband power. Nuclear fuel is orders (10^8) of magnitude more concentrated than conventional power sources. According to the Nuclear Energy Institute (NEI) [9], "one uranium fuel pellet creates as much energy as one ton of coal or 17,000 cubic feet of natural gas."

Although renewables have become more prevalent in recent installed capacity growth, they lack the energy density and base load power output to compete with nuclear power [10]. Figure 2 shows the population density for many countries relative to energy consumption per person in 2005. Overlaid are renewable energy capabilities from 2005. As you move towards the upper right, energy consumption per square meter increases. Some countries like Korea and Japan even if covered in wind turbines would produce less energy than is consumed there. The United States is amongst the top power consumers. If the population increases and more people choose to live in cities, the local power density constraints will become a larger problem.
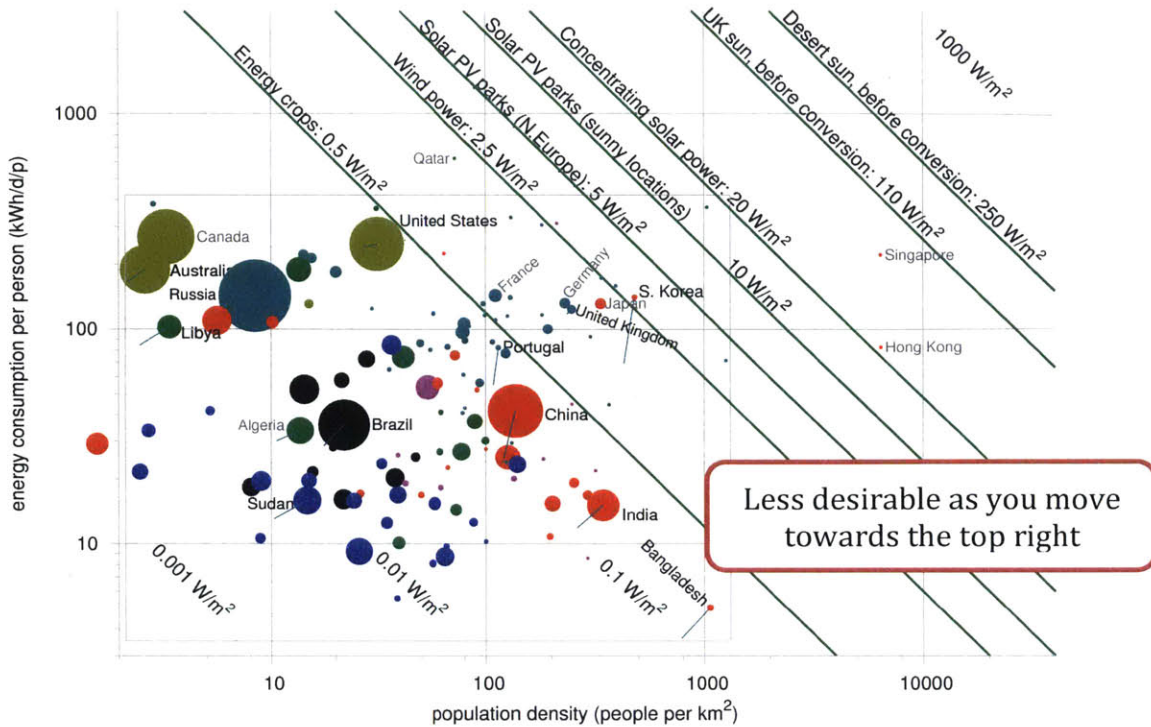
Figure 2 - Population Density vs Energy Consumption per Person, in 2005 [11]

Factor 2: Nuclear power has infrequent refueling cycles compared to other power sources.

During the winters of 2014 and 2015, the northeast faced record low temperatures and high-snowfall. Nuclear power produced 26% of the northeast's power during the early 2014 North American cold wave [12]. Under extreme weather conditions, nuclear power remains the most reliable power source. Coal and natural gas power plants require regular fuel transport in order to continue operating. This requirement can become a liability if the transportation systems are disrupted by weather or if refueling operations are not possible. It may even result in fatalities if conditions prevent populations from getting power when they need it most. Due to the small footprint and high energy density of nuclear power plants, they only require refueling every 18-24 months [13].

Factor 3: Nuclear power does not generate greenhouse gases during operation.

Nuclear power plants do not emit carbon dioxide, sulfur dioxide, nitrogen oxides, or other toxic gases [14]. The lack of greenhouse gas emissions during operation is a stark contrast to coal. Coal-fired power plants in the United States in 2014 made up approximately 39% of all US power production and emit on

average: 2,249 lbs./MWh of carbon dioxide, 13 lbs./MWh of sulfur dioxide, and 6 lbs./MWh of nitrogen oxides [15]. Figure 3 shows the estimated deaths and serious illnesses due to CO2 emissions from different power sources. Note the stark contrast between coal and nuclear power production.
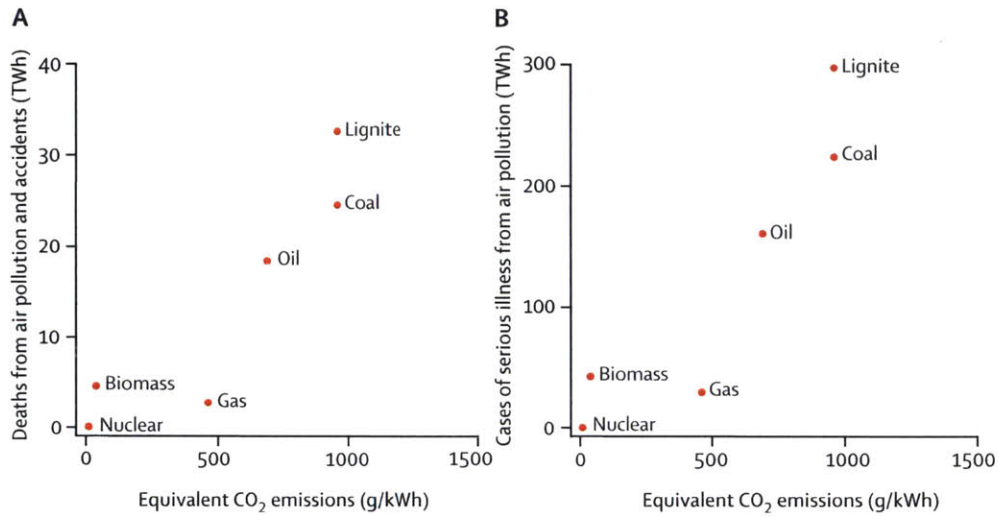
Figure 3 - Deaths (left) and Serious Illnesses (right) from CO2 Emissions [16]

Final Point: Nuclear power remains controversial.

Nuclear technology came to worldwide attention as a result of the bomb in World War II and has remained controversial since. Its unique qualities, the necessity of a response to climate change, and increased energy demand has made it a hotly contested power source with strong advocates at either extreme. Figure 4 shows some of common anti-nuclear assertions and some responses from the World Nuclear Association.

Common anti uranium/nuclear assertions	Main points of response
Uranium mines inevitably pollute their environment, tailings dams cause pollution through leakage.	Uranium mines today aim for zero emission of pollutants. Any water release is of surface run-off and is close to drinking standard. Tailings retention does not normally cause pollution off site. Major uranium mines in Australia and Canada have ISO14001 certification.
Uranium tailings retain almost all their radioactivity, which continues for hundreds of thousands of years.	True, but the level of radioactivity is very low & with normal engineering, they pose no threat to anyone. All the radioactivity is from the original orebody (no more is created). Uranium mine rehabilitation ensures that these are safe, stable and will cause no harm.
Uranium is potentially hazardous to miners' health.	Uranium mining is highly regulated in most countries and standards ensure that no adverse health effects are likely.
There is no safe level of radiation exposure.	While this is accepted as a conservative basis for radiation protection, it is not a scientific statement of fact. Low levels of radiation comparable to those received naturally in some places are not harmful. There is no evidence of any harm below about 100 mSv/yr.
Nuclear wastes (as, or in, spent fuel) are an unresolved problem.	In all countries using nuclear energy there are well established procedures for storing, managing and transporting such wastes, funded from electricity users. Wastes are contained and managed, not released. Storage is safe and secure, plans are well in hand for eventual disposal.
The nuclear industry is responsible for horrific wastes which will endure as a nightmare for our grandchildren.	Nuclear power is the only energy-producing industry which takes full responsibility for managing all its wastes, and bears the cost of this.
Nuclear reactors are unsafe, Chernobyl was typical, and resulted in a huge death toll.	The nuclear industry has an excellent safety record, with some 14,800 reactor years of operation spanning five decades. Even a major accident and meltdown as at Fukushima in 2011 would not endanger its neighbours. Some Soviet designed and built reactors have been a safety concern for many years, but are much better now than in 1986. The Chernobyl disaster was basically irrelevant to any western reactor, or any that might be built today. According to authoritative UN figures, the Chernobyl death toll is 56 (31 workers at the time, more since and nine from thyroid cancer). There were no deaths or serious radiation doses from the Fukushima accident.

Figure 4 - An Example of Anti-Nuclear Assertions and Responses from the World Nuclear Association [17]

1.1.3 Stakeholders and U.S. Nuclear Power

A nuclear project's lifetime is from its conception through its decommissioning. This timeframe can last 50 years or more. The United States Nuclear Regulatory Committee (NRC) is the licensing body in the United States and grants licenses for up to 40 years at a time, with 20 year renewal possibilities. It is worth exploring how stakeholders become stakeholders in a nuclear project and how to manage to

reach them successfully, because of the impact of the licensing process in the US. The temporal nature of stakeholders in nuclear projects means that within a nuclear project lifetime, stakeholders play many roles and will likely only be influential for a portion of the project.

Some may be extremists completely against nuclear power and some may be nuclear advocates, but most will be somewhere in the middle. These are the stakeholders that are of interest because they can be swayed depending on the nature of the outreach efforts by the plant owner. Traditionally nuclear projects have tried campaigns of education and donations to local organizations in order to ensure stakeholder acceptance within a community. In spite of this, there have been many instances of nuclear units being shut down prematurely due to opposition.

1.1.4 Vermont Yankee Nuclear Power Plant

The Vermont Yankee Nuclear Power Plant was a boiling water reactor (BWR) that provided 35% of Vermont's electricity consumption in 2008, and 72% of all electricity generated within Vermont [18]. It was shut down at the end of 2014 which resulted in a power generating capacity loss of 55% for the state. Seventy percent of Vermont's net power generation in recent years was from this power plant [19].

Although the NRC renewed its operating license in 2011 for another 20 years, the Vermont state legislature passed legislature aimed at being able to control whether the plant would be allowed to operate. This meant that the parent company in charge of Vermont Yankee, Entergy, now had to get approval not only from the NRC (the federal regulatory body) but also the state in order to operate. Entergy entered litigation and won in 2012 but ended up deciding to terminate plant operations in 2014, while citing economic factors. The decommissioning cost is estimated at more than a billion dollars but only about half of that was collected while the plant operated [20]. The result is that it is unclear where the money for decommissioning will come from, now that the plant is inoperative, and that it is neither producing value for the community nor the parent company.

1.2 The Case for Change

Given how many failures are seen due to stakeholder mismanagement and how important most of the projects are that do fail, the current way by which many organizations handle stakeholder outreach has to improve. Stakeholder engagement can be done better for many reasons.

1. There is tremendous resource loss and increased risk of failure when different organizations and projects each start from scratch every time they have to engage stakeholders. They must each determine what outreach means, who is important, and must create their own mental models of how to achieve the outcome that they want. The rework being done is very expensive. The person in charge of public outreach often has to draw upon their own experiences to form a model and that person's skill and relevance can change greatly from project to project.

2. If every project creates its own models then discards them, learning potential is lost because commonalities between solutions cannot be examined. Since projects run for varying lengths of time, it is likely that the person responsible for public outreach will change. If a standardized model is used then the ability for someone else to take over and understand what is happening is enhanced. Lessons applied from one experience can be incorporated and applied elsewhere, and it is possible that executive management may understand better how to run controversial projects. This can avoid several recurring problems and open the possibility that if we can articulate better how to do public outreach, then more projects will be successful.

3. Stakeholder outreach is not often seen a performance indicator, especially for controversial engineering projects. It is hard for engineering organizations to understand that they must continuously manage their stakeholder relationships in controversial projects because the environment is constantly changing. When a project has strong advocates and detractors, a small event can cause big problems. The temporal nature of stakeholder management means that if you miss an opportunity, it may not come back and it may be too late to recover the relationship should things go wrong.

4. Finally, existing methods and metrics of stakeholder management efforts lack the fidelity to convey truly what is happening. Rather than use particular quantitative metrics like surveys, a better solution could be to use system dynamics to capture the non-linear feedback relationships involved in stakeholder relationships.

1.2.1 The Golay-Williams Stakeholder Engagement Model

The Golay-Williams stakeholder engagement model is a System Dynamics (SD) model developed at MIT by Professor Michael Golay and PhD Candidate Adam Williams as part of a research grant from the United States Department of Energy (DOE). It goes beyond the concept of "better communication" to address the problems of stakeholder management in the industry. It includes "new methods, models, and understandings of the bases for successful communication and acceptability regarding nuclear enterprise projects, and of successful design of such projects in terms of ultimate stakeholder acceptance [21]." The model is mature, having been developed over three years, and it is ready for testing.

1.3 The Research Question

We have established that stakeholder management can often be improved upon, and that there is a model available to possibly do so. If the model is useful to those managing stakeholder relationships, that could be extremely significant across multiple applications. This report seeks to answer the following research question:

> *Is the Golay-Williams stakeholder acceptance model plausibly useful to*
> *individuals responsible for success in managing stakeholder relationship*
> *on controversial projects?*

1.3.1 Research Question Factors

In order to properly answer the research question, some criteria are important. The following have been identified as factors to be used in answering the question:

1. Where the model is accurate and where it can be improved.
2. How a successful project is run – there are enough failures that it isn't as interesting to study failures as studying a successful example of stakeholder engagement.
3. How stakeholders identify themselves and how they fit into the model.
4. What is not captured by the model?

1.3.2 Case Study of a Nuclear Power Plant

We have established earlier in this chapter that nuclear power plants are socially controversial and yet an important US energy source. Targeting a particular case for evaluation of the model is critical to understanding better how well the model works and to answer better the question of whether the Golay-Williams model is useful to someone doing stakeholder relationship management. For that reason this report examines the research question and factors as they apply to an active Nuclear Power Plant (NPP). All research was done in accordance with MIT protocols regarding the use of human subjects which includes confidentiality for the NPP and any stakeholders involved.

The NPP in question has been running for decades and it is considered a successful project by the nuclear industry. The specific research questions that emerge from a case study of the NPP are:

1. Does the stakeholder framework developed at MIT accurately reflect the realities in three recent stakeholder relationship engagement campaigns at the NPP?
2. How did the key stakeholders involved in those three engagements become stakeholders?
3. What controls the dynamics on these stakeholder relationships?
4. What are the stakeholder attitudes toward their interactions with the plant and how do these map to the model?

1.3.3 Objective

The topic of this report is formed around a research question with the goal of structuring future efforts to answer the question. The goal of this report is a case study on the NPP concerning nuclear stakeholder dynamics. It in the end is part of work on controversial projects in general but also sheds insight into what happened and is happening at the NPP. This is not a paper on public outreach or stakeholder management in principle, it is a paper on how stakeholder relationship management can be done successfully. The richness and relevance of the topic is in the details of how this particular NPP manages the dynamics rather than the fact they do manage public outreach.

Chapter 2 – Literature Review and Research Methods

This Chapter has a literature review on key information regarding the Golay-Williams (GW) model, and a description of the research methods that were used in making this report. Work for this report was done over a period of seven months. This includes background research, interviews, and analysis. Academically, background studies were done on System Dynamics (SD), the GW model, nuclear technology, the nuclear power plant (NPP), and its community. After relevant background information was studied and data was collected from the facility and its community, analysis was done back at MIT to answer the questions surrounding the model's applicability.

2.1 Literature Review

A baseline understanding of system dynamics and the GW model are required to understand the implications of this report. The minimum amount of information needed to interpret the report is described next.

2.1.1 System Dynamics

Professor Jay Forrester developed System Dynamics (SD) at MIT in the 1950s. SD looks at elements of a system (in this case the stakeholders as applied to a nuclear power plant) in nonlinear terms as complex interactions. Since it is neither purely quantitative nor qualitative it can better express the realities of certain complex systems including stakeholder analysis.

SD can express the behavior of a complex system using a combination of feedback and balancing loops. Feedback loops are a key characteristic that sets SD apart from other modeling methods. For the purposes of this report, the feedback loop is the most important since the Golay-Williams (GW) model is comprised of them. A simple example of a positive feedback loop is in the following figure where an increase in elephant births positively affects the elephant population, which in turn increases the amount of elephant births.
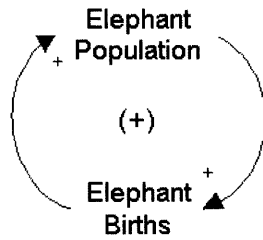
Figure 5 - Positive Loop Responsible for the Growth in an Elephant Herd via Births [22]

According to other MIT researchers [23]: "combinations of balancing and reinforcing loops can be used to explain complex system behaviors by modeling nonlinearities, heterogeneity, temporality, asymmetry and micro/macro scale effects of complex systems. This ability of system dynamics to simply model complex system behaviors led to the selection of system dynamics to model stakeholder acceptance of social controversial nuclear projects."

2.1.2 The Golay-Williams (GW) Model

The GW model is a SD model which uses several large causal loop diagrams (CLDs) to express the dynamics behind stakeholder behaviors. There are two CLDs that are used in this report: an individual acceptance CLD and a local stakeholder acceptance CLD.

2.1.2.1 Causal Loop Diagram 1: Individual Acceptance

The purpose of this CLD is to model an individual attitude towards a new nuclear project, and whether they accept it [24]. "Acceptance" is defined within the GW model as when a project is allowed to proceed, given specific (tolerable) constraints [24]. This does not necessarily mean that they strongly support it, but that they allow it proceed. Three general factors that lead to personal decisions about project acceptance regarding nuclear energy attitude formation are:

1. a cost/benefit analysis
2. the use of reference groups (individual attitudes based on trust in the reference group)
3. individual core values [25]
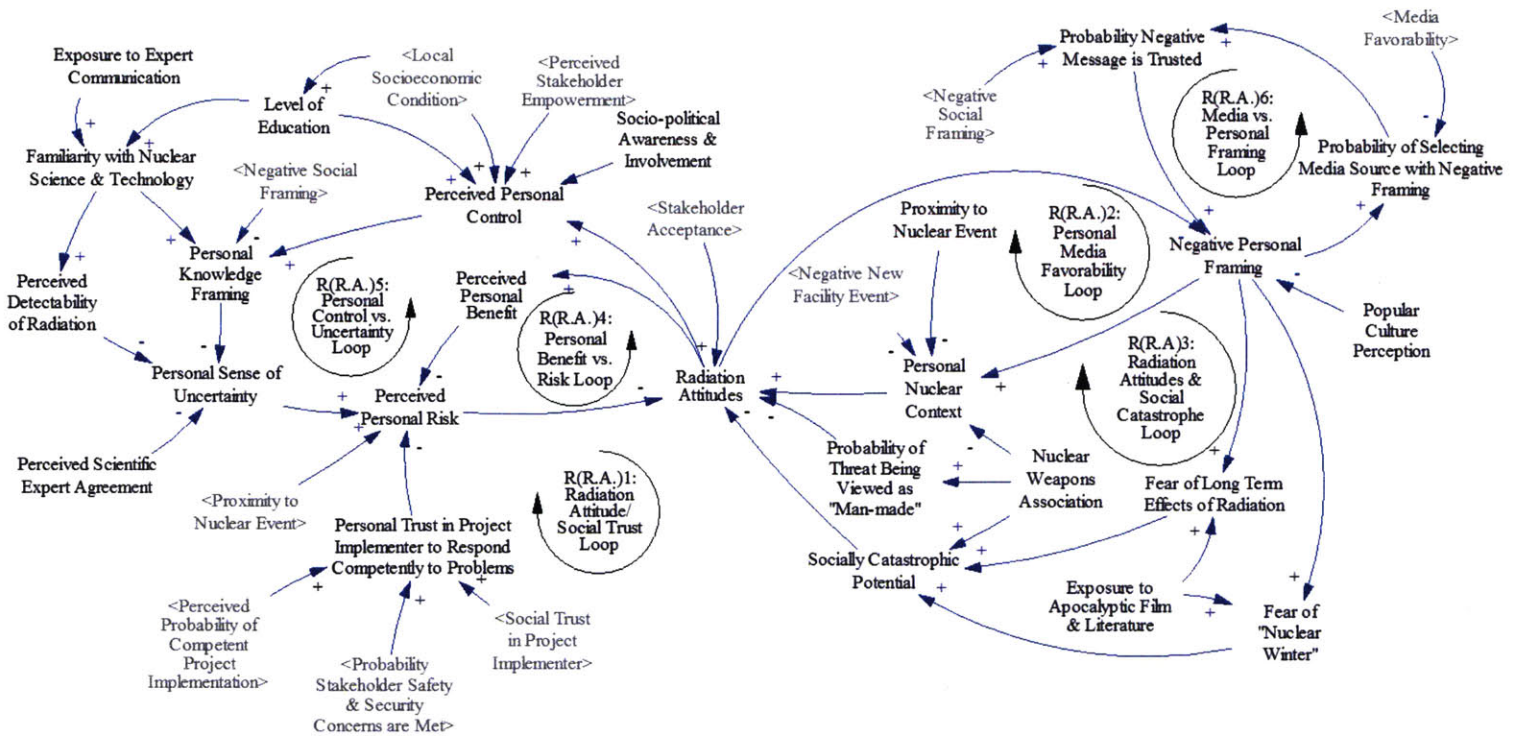
Figure 6 - Individual Acceptance CLD [24]

The different sections of the CLD articulate elements driving the individual's tendency to accept a nuclear project. At the very center of the CLD is the variable 'Radiation Attitudes' which is defined as: "the comprehensive reflection of personal attitudes related to facilities using ionizing radiation... 'Radiation Attitudes' is both the influenced variable (being increased with a decrease in 'perceived personal risk,' for example) and the influencing variable (with its increase resulting in increased 'personal & social trust in the implementer,' for example) [24]."

This CLD is a large reinforcing loop, so if the individual in question frames a new nuclear project positively, they will similarly view related technologies positively. The perceived extent to which the individual has control over the decision making process is modeled. Also included, and relevant to this report, is the extent to which an individual trusts the project implementer to act in society's best interest [23].

2.1.2.2 Causal Loop Diagram 2: Local Stakeholder Acceptance

While the first CLD modeled an individual's acceptance of a controversial project, the local stakeholder acceptance CLD models the elements that affect stakeholder groups' support of a project. The stakeholders in a community often have to evaluate the positive benefits of a new project relative to their perceived risk. Because there is often a discrepancy between the perceived risk and the actual risk, this CLD was designed to model perceived risk as it drives how the stakeholders react. Some examples of perceived risks related to a nuclear facility include the possibility of an accident, the perceived risks associated with the storage of spent fuel, and the possible reduction in property values in the area as a result of the project [23].
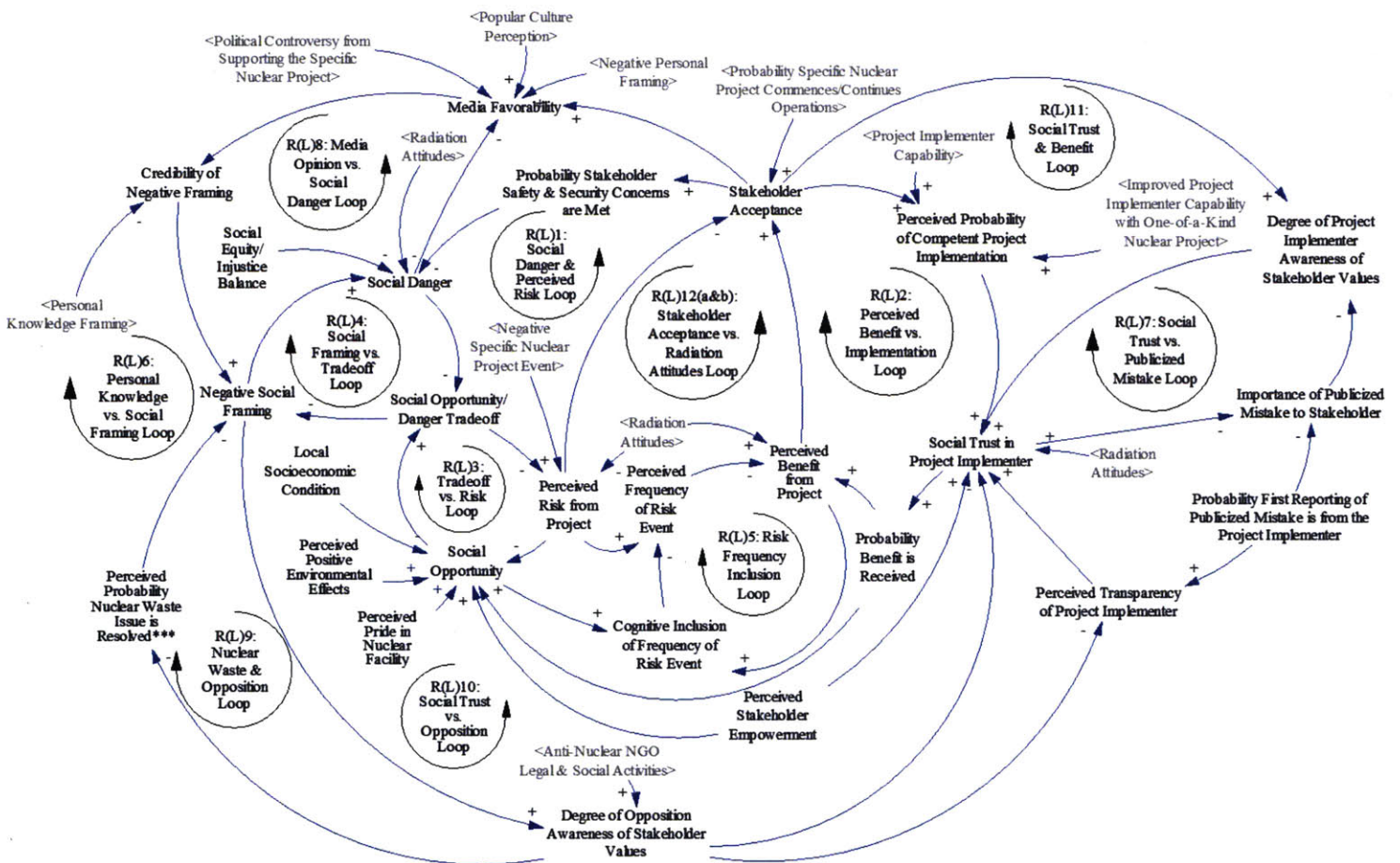
Figure 7 - Local Stakeholder Acceptance CLD [24]

This CLD expands on the previous model by including social risk and social benefit as opposed to individual risk and benefit. It also provides deeper insight into how the perceptions of risk and benefit are formed, specifically on how well the project implementer's values align with stakeholder values and how transparency contributes to trust in the implementer over time [23].

The extent to which low frequency adverse events at nuclear facilities affect stakeholder's perceptions is modeled, along with other information sources such as the media, stakeholder groups (opposition and supporting groups). It also models how stakeholders frame their knowledge as they analyze risk and benefit [24].

2.1.2.3 Key Conceptual Behavior from the Golay-Williams Model

The following tables list the key conceptual behavior from the individual acceptance and local stakeholder acceptance causal loop diagrams in the Golay-Williams model. These behaviors articulate how the model views individual acceptance and local stakeholder acceptance. Each behavior is followed by a description. The purpose of listing them here is to capture the essential behavior of the GW model in an easily understood form (as opposed to going into the system dynamics model in great detail). Using these key conceptual behaviors, we are then empowered to examine whether they reflect the interviewees' attitudes.

Table 1 - Key Conceptual Behavior in the Individual Acceptance Causal Loop Diagram [24]

R(R.A.)1: Radiation Attitude/Social Trust Loop (c)	Dynamic relationship between individual beliefs on radiation and stakeholder trust in project implementer
R(R.A.)2: Personal Framing Loop	Reinforcing influence of misinformation/ negative reporting of nuclear project on risk/ opposition
R(R.A.)3: Radiation Attitudes & Social Catastrophe Loop	Individual fears influence expected social fears and negative outcomes
R(R.A.)4: Personal Benefit vs. Risk Loop	Acceptance varies for individuals with same individual radiation attitude for different nuclear fuel cycle facilities
R(R.A.)5: Personal Control vs. Uncertainty Loop	Increasing sense of control can offset increasing levels of uncertainty – recent emphasis on 'consent-based siting'
R(R.A.)6: Media vs. Personal Framing Loop	Influence of trusted information sources on how messages regarding risk/benefit are received

Table 2 - Key Conceptual Behavior in the Local Causal Loop Diagram [24]

R(L)1: Social Danger & Perceived Risk Loop	Reinforcing nature of tangible danger on perceived risk
R(L)2: Perceived Benefit vs. Implementation Loop	Competency and social trust of project implementer reinforces perceived and received benefit
R(L)3: Tradeoff vs. Risk Loop	Dynamic by which risk is either increasingly seen as an opportunity (and decreasingly as a danger) or vice versa
R(L)4: Social Framing vs. Tradeoff Loop	Reinforcing effect that perception (influenced by negative framing) can have on tangible danger
R(L)5: Risk Frequency Inclusion Loop	As benefits increase, descriptions of associated risks increasingly reference low frequency of occurrence; as benefits decrease, any risk is problematic
R(L)6: Personal Knowledge vs. Social Framing Loop (c)	Facts and 'objective' knowledge can easily be co-opted or overwhelmed by framing of the project
R(L)7: Social Trust vs. Publicized Mistake Loop	Illustrates importance of (1) project implementer having a high awareness of what stakeholders consider important and (2) minimizing the potential negative aspects of publicized mistakes
R(L)8: Media Opinion vs. Social Opinion Loop	Influence of media opinion on tangible danger and stakeholder acceptance
R(L)9: Nuclear Waste & Opposition Loop	High level of influence nuclear waste has as the 'crown jewel' of anti-nuclear lobby argument
R(L)10: Social Trust vs. Opposition Loop	Opposing viewpoints gain salience/merit as stakeholders lose trust in the project implementer
R(L)11: Social Trust vs. Benefit Loop	Trust is easier to initiate, maintain and (if needed) recover as benefits are realized
R(L)12(a&b): Stakeholder Acceptance vs. Radiation Attitudes Loop(s) (c)	Inextricable, dynamic link between individual beliefs and stakeholder acceptance that changes over time (e.g., new 'pro-nuclear' Green movement)

2.2 Research Methods

Interviews were the primary research method used in compiling this report. We were able to work with a Nuclear Power Plant (NPP)'s public outreach staff to determine key stakeholders, interview them along with the NPP staffers and then evaluate whether the realities expressed through the interviews were reflected in the model.

2.2.1 Nuclear Power Plant Site-Visit

The research team comprised of Michael Golay and Adrien Laws visited the Nuclear Power Plant (NPP) and its neighboring city in order to evaluate stakeholder relationships in person through interviews. Before going to speak to stakeholders, we went to the Nuclear Power Plant and visited the facility and its public outreach staff. As part of our pre-work before arriving at the facility we had highlighted three major incidents of stakeholder engagement management at the facility to ask the NPP staff about. These were:

1. A license renewal process
2. Steam generator replacements
3. An expansion of nuclear waste disposal

For each we did research on the situation in the case, what the NPP perceived and what they did, the result (positive or negative for the NPP), and the rationale for why we think these factors are important so that when we interviewed the NPP Staff we could have a higher quality conversation.

2.2.2 Interviews

We interviewed 10 different people for this report, with 7 being stakeholders and 3 being from the NPP. The interviews were approximately one hour each, with some going longer. All interviews were done in accordance with MIT protocols including COUHES for use of human subjects that includes interviewee confidentiality. The format was open-ended in order to ensure capture of information we were not considering. We asked open-ended questions along three themes and then made detailed notes of the interview. The three themes were:

1. What are the factors that make it attractive/unattractive for you as a stakeholder to be engaged with the NPP?
2. What do you look for from them to make them a partner that you work with?
3. What could they do better? Are there other things that are important for them to do?

Table 3 - Interviewee List

#	Interviewee	Method	Interviewers
1	NPP Staff A	In person	G, L
2	NPP Staff B	In Person	G, L
3	NPP Staff C	In person	G, L
4	Government Stakeholder A	In person	G, L
5	Government Stakeholder B	In person	G, L
6	Union Stakeholder	In person	G, L
7	Emergency Personnel Stakeholder	In person	G, L
8	Chamber of Commerce Stakeholder	In person	G, L
9	Private Business Stakeholder	In person	G, L
10	Nonprofit Organization Stakeholder	In Person	G, L
11	Emergency Personnel Stakeholder	Phone interview	L
G = Professor Michael Golay, L = Adrien Laws			

2.2.3 Analysis

Once the interview notes were compiled, analysis began by mapping the interviews to themes that presented themselves across stakeholders. These themes were then mapped to the key conceptual behavior from the GW model outlined earlier in this chapter. An evaluation was made as to whether the model accurately reflected these themes. Chapter 3 summarizes the findings as related to the stakeholder interviews, and Chapter 4 focuses on the NPP strategies and engagement cases. It was helpful to perform the analysis separately for interviewees who are part of the NPP and those that are not because they were very different perspectives on the NPP's efforts. The NPP staff had an inside-out view of the NPP's work and strategies while the stakeholders had their own opinions looking in from outside. The separate analyses allows for comparison between them and an examination as to whether the strategies pushed forth by the NPP in stakeholder relationship management are effective.

A limitation of this study is that only one person, myself (Adrien Laws), compiled all the interview notes so there is the possibility of consistent interpretive bias. However, this helps ensure consistency in the bias compare to a case where different people conducted different interviews.

Chapter 3 – Stakeholder Interviews and Model Analysis

This Chapter explores where the relationships expressed in the Golay-Williams model correspond to what was observed through stakeholder interviews and where they do not. It maps interview themes to key conceptual behaviors from the Golay-Williams model in order to identify where the model works well and where there are discrepancies.

3.1 Interview List

The following table lists the details of stakeholder interviews that took place throughout July and August 2015. All interviews were done in accordance with MIT protocols and the Committee on the Use of Humans as Experimental Subjects (COUHES) that requires interviewee confidentiality [26]. Seven different stakeholders were interviewed including government and private sector workers in order to get many different viewpoints on the NPP and its operations.

Table 4 – Stakeholder Interview List

#	Interviewee	Method	Interviewers
1	Government Stakeholder A	In person	G, L
2	Government Stakeholder B	In person	G, L
3	Union Stakeholder	In person	G, L
4	Emergency Personnel Stakeholder	In person	G, L
5	Chamber of Commerce Stakeholder	In person	G, L
6	Private Business Stakeholder	In person	G, L
7	Nonprofit Organization Stakeholder	In person	G, L
8	Emergency Personnel Stakeholder	Phone interview	L
G = Michael Golay, L = Adrien Laws			

3.2 Stakeholder Realities Captured by the Model

The goal of this section is to see if the relationships expressed in the Golay-Williams model correspond to what was observed through stakeholder interviews. Interview transcripts were analyzed, common themes were identified, and then these were scrutinized to see if they accurately reflect the realities of the model. The following table lists the stakeholder interview themes and how well they are reflected in the model.

Table 5 - Model vs. Interview Realities

Interview Themes Captured Well	Interview Themes not Captured Well
Symbiotic Relationship	Threats to Trust
Economic Impact	Sense of Fairness Violations
Augmented Capabilities	Internet Slander
Human Employee Visibility	Unique Details Concerning the Relationships
NPP Contact Response Time	
Trust, Safety, and Fear	

3.2.1 Symbiotic Relationship

There was a strong feeling across stakeholders that the nuclear power plant (NPP) was proving substantial benefit to them in a direct manner and that this was important. However they also recognized that the plant was seeking approval and that they must maintain a cordial distance or they risked being labeled as "cheerleaders" for the plant.

From an economic development standpoint the NPP rates very highly in the community. The number of jobs, the community support, charitable support, property taxes, and school impacts were understood as being powerful ongoing programs for the community. The sense was that if they were to go away there would be some very serious economic impacts to the community.

Some stakeholders mentioned that when they ran for their positions they were warned not to say anything negative about the NPP's parent company because it could hurt them. This reflects the role the NPP plays in the economy and also amongst the nonprofits. Many stakeholders highlighted the nonprofit donations from the NPP and the NPP's willingness to participate in new nonprofit donations or funding. This means that for stakeholders who face the community, it does not do them good to have poor relations with the NPP.

3.2.1.1 Communications

The NPP obviously does not want to have poor relations with the stakeholders or the community. This results in a cordial relationship where stakeholders and the NPP try not to surprise each other with bad news because it would not help either party to do so. The sense from stakeholders was that the NPP keeps them informed on what is going on. This has evolved to an unofficial standard of interaction between the governmental stakeholders and the NPP. In one interview it was said that hypothetically if the stakeholder knew that a group was going to disrupt an NPP meeting they might notify the NPP as a courtesy.

Overall the ongoing consistent communication was perceived as key on many levels and symbiotic. It would not be beneficial for the power plant to have poor communication with the community and it would not be beneficial for the community. The payoff of the quality and speed of community efforts from the NPP is that the community stakeholders get a chance to respond to news before it affects their stakeholders. This increases the trust and level of relationship between the stakeholders and the plant rather than hearing of plant incidents later from other sources. Several stakeholders said the NPP was very good at that, while keeping a level of confidentiality that is necessary for their organization. As one said: "we don't get blindsided by their organization. It works both ways, they trust in us and we trust in them."

The governmental stakeholders must work on certain things together with the NPP. One example is with emergency service rescues or drills. These annual drills help solidify the sense of working together because an incident or lack of preparedness does not serve either party. The funding provided by the NPP for emergency services augments the abilities of the county but they are also scrutinized because the stakeholders cannot be seen as puppets of the NPP. The overall sense from stakeholders is that the plant is well run but that there is a professional distance that must be kept at all times. For many stakeholders it is important that their constituents see them as not obviously grandstanding with the NPP but also not being too close to them.

3.2.1.2 Pressure on the NPP

Sometimes the stakeholders have to put pressure on the NPP in order to get things done or to get information that the NPP might not want to volunteer. It also happens that the constituents of the stakeholders demand that certain pressures be put on the NPP. This can stress the relationship between the NPP and the stakeholders. After Fukushima there was understandably a lot of concern in the community regarding the NPP.

Some stakeholders have public forums where constituents can air grievances or concerns regarding the plant and this resulted in letters being drafted to the NPP demanding to see safety studies. The NPP was reportedly not happy to receive these from the stakeholders they worked closely with. However, the stakeholders do not have direct authority over the plant and this provided a stopgap of pressure during periods of high contention. As one stakeholder put it: "That's a federal issue over the plant. Even when [our constituents] are pushing on us to shut the plant down, we can say we don't have the power. Sometimes we express a community opinion on the plant and the [NPP's parent company] didn't particularly like it but [we've] tried to work with them."

3.2.1.3 Answering Constituent Concerns

The NPP and its parent company try to send an environmentally positive message. Partnered with the organizations within the district to cover parking lots with structures that were solarized. There is a benefit to governmental officials if they do that. They have been very aligned with the idea of addressing climate change. This helps garner support from certain constituents.

Many stakeholders said that in regards to Fukushima the NPP was very helpful in answering questions from an alarmed community even though this was not the NPP's incident. They helped quell the question of "how much radiation am I going to get?" by doing field measurements and educating the public on the radiation levels present in the community. However it also brought up the fact that there are risks to having the NPP in the community and that certain community interests groups will react to the spike in safety concerns. The stakeholders must then respond. It has been fortunate for the stakeholders that the NPP has been able to provide safety experts to address those concerns and temper the fear from Fukushima type events. Overall the role most stakeholders saw themselves in is that there is a nuclear power plant in the community and they will take it seriously as it pertains to their jobs but it is not their job to manage the plant directly. This creates an interesting dynamic when

constituents apply positive and negative pressure on the stakeholders as it relates to the NPP and safety concerns.

3.2.2 Economic Impact

The NPP's economic impact on the community is huge. Its payroll is bigger than that of the nearby city and it pays tens of millions of dollars in taxes yearly. All stakeholders that were interviewed were aware of the impact of the NPP on the community from an economic standpoint.

3.2.2.1 If the NPP Were to Close

A huge number of stakeholder constituents would be affected if the NPP were closed down, which again highlights the symbiotic relationship between the stakeholders and the NPP. For governmental officials in charge of education the economic arguments are less important, but the school district would be in for a devastating loss if the plant were to close. The property taxes from the NPP in the tens of millions of dollars is applied to the school district's educational budget. Also a large number of people would need to find work and would struggle to maintain the same lifestyle created by the many hundreds of head of household jobs that the NPP provides.

These laid-off, highly specialized, employees may have obsolete skills that are obsolete for other industries due to having been employed by the same employer for a long time. They have high wages, and very specific skills. When another non-nuclear plant shut down, a lot of the workers retired and some moved far away. In the case of the NPP and the volume of people affected, the impact of a shutdown would be severe on the community stakeholders.

3.2.2.2 Economic Support for the Community

Locally the NPP supports a lot of non-profits and community work. Stakeholders mentioned that there was almost always a fund or support granted from the NPP for non-profit causes. Nearly every event has a supporting grant from the NPP. This tends to make them locally popular. Many in the community separated the NPP from its parent company, so although events may occur in the news from the parent company that are negative, the NPP is viewed as separate.

3.2.2.3 Local Business Support

Periodically the plant calls in workers for refueling operations and for contract work. One stakeholder mentioned that when they call in several hundred additional workers it is a huge economic incentive. There's no denying the economic benefit. There's a secondary positive effect from this work due to a positive experience from working at the plant. The vast majority of workers (according to stakeholders) leave with a good impression.

Those are things that the NPP does very well in trying to buy locally. This engages the local business community. It also creates many head of household jobs. With hundreds of head of household jobs available from the NPP, economic prosperity in the area is high relative to other jobs. Their jobs also include medical benefits and retirement packages that end up offering a higher standard of living than most other businesses in the community.

Stakeholders also recognized that the NPP always pays their bills on time and there were no bounced check or other financial difficulties when dealing with them. The consistency of successful business transactions with the NPP was viewed favorably and helped reinforce them as a good source of economic prosperity within the business community.

The prevalent attitude of skilled workforce union members is that we can't produce enough power with alternative energy sources and that the NPP produces it cheaper and in much larger properties. The other problem identified with renewables is that there is no work for skilled unions from the area in a solar plant. Working with the NPP is a better option than not, if given the choice between renewables and the NPP.

3.2.2.4 Community Awareness

All stakeholders understood the impact of the NPP on the local community. The NPP's outreach activities and economic impact statements were successful in conveying the fiscal impact of closing it. The NPP has conducted several economic symposiums concentrating on their value to the community which have been successful. It has also conducted many volunteer projects that benefit the community through donations. Examples include installing more energy efficient bulbs, donating electric auto recharging stations for parking lots, and installing solar panels for nonprofits. The physical presence of the donated equipment is a reminder of the NPP's presence in the community.

Stakeholders mentioned that before the NPP replaced its steam generators, the plant's value had depreciated and the school budget took a hit in funding due to lower NPP property tax yield. After the new steam generators were installed, the taxes went up. Stakeholders in the community both understand the impact of the plant and have witnessed it, which is a powerful message.

Most stakeholders mentioned economic impact reports the NPP publishes which lay out how the NPP affects the community. They mentioned how the NPP invites people to lunch to learn about it and how the NPP makes active efforts to disseminate its presence into the community. This complements well with the nonprofit donations, the volunteer efforts, the reliable business interactions, the millions of dollars in property tax collections, and the head of household jobs provided by the NPP. Stakeholders mentioned that they hear from employees about working at the plant and their own livelihoods. This is helpful when the plant is trying to get approval for a critical project like their license renewal. Many stakeholders said things like: "a lot of people are in favor of the plant and bring up [the question] can you imagine what would happen if it were to close?" Some stakeholders mentioned that the NPP is very aware of their position as a driver for the community economy and that they leverage it but don't dangle it as a threat.

That said, this understanding of economic prosperity from the plant can sometimes result in opportunistic legislatures or stakeholders capitalizing on it. Several stakeholders noted that when the NPP needed approval for their steam generator replacements from a government body, they were forced to provide a "donation" of resources. It was viewed essentially as a quid-pro-quo for getting the permission to move forward. This speaks to a vulnerability the plant has when faced with such regulatory impasses. In this case, the view of the plant as an economically prosperous venture most likely resulted in higher costs for the steam generator replacement.

3.2.3 Augmented Capabilities

The skill level for craftsmen work at the NPP is considered the highest levels in the industry. Some stakeholders mentioned that this makes craftsmen from the community better because they have to work at a very high level. The feeling was that this skill level was so high that it benefits the community because that skill is then applied to other, non-related projects such as building houses, bridges, or government buildings. It was a competitive differentiator to say you have worked at the plant and have

acquired better work skills. There is a lot of site-specific training and the NPP provides a teammate to learn from. This was recognized throughout the community according to stakeholders.

3.2.4 Human Employee Visibility

While the location of the NPP is remote from its supporting population, the plant is very active in the community. Several stakeholders expressed the view that since the physical location is remote but the employees are not it helped create a very positive impact. The jobs and fiscal strength were felt and at all major community events a representative of the NPP was perceived as being present. The remote industrial facility helped reduce the fear and many stakeholders said they had never been to the actual facility but felt like they knew what it was about. The "veil" of secrecy concerning the plant is countered by the very tangible public outreach efforts.

3.2.4.1 Employee Visibility

The NPP is the largest employer in the county. Because they pay their employees well and treat them well, there is a lot of buy-in from stakeholders. They would often mention little anecdotes like: "my friend's husband works there. If the plant would close down then my friend's husband would be out of a job. I know that they provide a good living." The volunteer efforts put forth by the plant and their employees are very visible. The employees' efforts help humanize the NPP and reinforce their presence in the community. There is also always a booth from the NPP at local fairs. The NPP employees are seen as an asset to the community. They are thoughtful about community engagement, whether they are philanthropic or involved in different community organizations. The quality of the people who work at the NPP is considered to be very high, and that is considered to be a positive thing.

3.2.4.2 Union Relations

Although the NPP doesn't have to negotiate with unions and could run the plant as is, they nevertheless do work with unions. They made a company decision to sit down with the workers and their representatives. Stakeholders mentioned that this says a lot about them as a company and that they are proud of their interactions with the NPP because they have employed a lot of people in the community. Labor unions are very supportive of the NPP, and this positive relationship helps elected officials to have a better relationship with the NPP. There is a transitive relationship property in this

because the union workers are strong representatives of the community and approve the plant, the community views the NPP more favorably.

3.2.5 NPP Contact and Response Time

Many stakeholders cited the NPP's communication response time as notable and important. If stakeholders have questions they find them to be responsive. Local executives were accessible and responsive regarding safety and community engagements. Stakeholders mentioned that when they have large corporations in their community it is important to see them active and responsive. It was extremely important to most stakeholders to have a rapid response time from the NPP.

3.2.5.1 Communication Fidelity

Some examples of communication between stakeholders and the NPP are texting NPP response staff right away if there is a power outage, and having the phone number of the site VP of the NPP. It is not only the ground level employees that are accessible, but also the higher ups. Given the economic impact of the plant and the safety concerns the public may have regarding the NPP, it is critical for the community to feel that the plant is not hiding anything. It also helped increase the trust between stakeholders and the NPP by having a sense that they would not be blindsided by an adverse event.

One stakeholder had the following to say: "being able to say to my constituents that I can talk to higher level people who they can't talk to is helpful. Sometimes they inform me on things within the company that might have nothing to do with our normal conversations. For example, their president was going to retire soon and they wanted to let me know before that became public... Sometimes what you get with corporations is you will deal with a certain person of a certain level and that's it, but they've been really accessible throughout their organization."

3.2.5.2 Fukushima Response

The Fukushima accident was frequently cited during the interviews as a significant public outreach effort by the NPP. When it occurred, stakeholders were scrambling for responses to their constituents because there was a lot of fear, and it was a good opportunity for critics of nuclear power to go on the offensive. The supporters of the plant and those who depend on it for economic livelihood also had a strong reaction because the Fukushima event put them at risk. Stakeholders in the community had to

respond to both parties quickly and effectively. The NPP and its parent company were willing to come to the town and speak to address concerns. They never turned down the stakeholders in regards to appearing and answering questions. The NPP was perceived as providing the right people at the right level to address the issues and to speak in depth about what was happening.

3.2.5.3 Public Forums

The public forums the NPP holds are unique to them. There is no other industry in the area that requires such forums or would voluntarily hold some type of public hearing. However the concept of an open forum, not just to speak to the NPP but also to critique them, and have specific issues addressed, did a lot for some stakeholders to increase approval. There was a sense that a lot of the issues that came up at the NPP public forums were things that certain stakeholders would not have known about if there were not an open forum.

3.2.6 Trust, Safety, and Fear

Trust, safety, and fear were coupled in the interviews, and how they played out for each stakeholder was at times quite complex. Where the stakeholders fitted into those themes was also very complicated because they must answer to their constituents, and can't be seen to be siding too closely with the plant, but at the same time they want to help it succeed as long as it remains safe and a benefit to the community. When a scare occurred such as at Fukushima, or when a safety concern arises, it often put the stakeholders in a difficult position where they needed to figure out quickly what their stance was regarding the NPP. The NPP in turn must manage its reputation and their reaction to such crises in order to ensure continuous operations.

All interviewed stakeholders held professional positions and felt that the plant was not inherently dangerous. That said, there was an acknowledgement that the plant and its parent company are for-profit enterprises and that nuclear power must be managed safely. It would be damaging for all stakeholders if there were to be a serious incident at the NPP. One stakeholder said: "We believe Reagan's quote of 'trust but verify.'" Certain topics caused spikes in concern, notably nuclear waste and the fact the plant is for profit by nature.

3.2.6.1 Nuclear Waste

There are stakeholders who could not care less about nuclear power issues, such as the storage of nuclear waste. They focus on the NPP's role in generating lots of jobs and that they pay into the community. However, for some stakeholders it was a hot button issue, especially if they had to answer to constituents who were focused on the perceived danger of waste. One stakeholder was asked about such constituents and what they wanted: "they were concerned about the way [that] they are stacking the waste in the dry cask storage. There is opposition to the dry cask storage. The storage of the waste is [a fact] that nobody likes. That's one area of agreement." This concern over nuclear waste was described by several stakeholder as linked to the NPP's parent company's motives as a for-profit enterprise.

3.2.6.2 Corporate Suspicion

Several stakeholders mentioned that they are suspicious of the plant's motives for profit. The economic benefits for the community are clear but there is still a sense that this corporate enterprise could be dangerous. The idea is that the NPP or its parent company may decide to cut corners for their own benefit at the expense of the community. Accountability was a huge mitigating factor for such feelings and as long as it was clear that the NPP would "have some skin in the game as any community member would," it went a long way to quelling these suspicions. However, that pervasive doubt and wariness was present consistently in some stakeholders. If the NPP were to be found guilty of a safety violation and not punished, or if they tried to hide it, support would wither from many stakeholders. This forces the NPP to have strong integrity throughout its operations and communications, which it does at the present time.

When scandals or incidents happen to the NPP's parent company, the NPP generally does not feel a large reaction from the community or its stakeholders. This is most likely due to the strong sustained public outreach and community messaging efforts that the plant has fostered. Many stakeholders viewed the NPP and its parent company as discrete for their purposes. For example one stakeholder said: "some emails came out over the last few years that suggested the relationship between the regulatory commission and the [NPP's parent company] was far too cozy. It didn't look good for either side. Things like that make a lot of news more so in major newspapers. Whenever there's anything [like that] it goes out to the media but it really doesn't penetrate locally. To anyone

who doesn't like the [NPP's parent company] and doesn't want the plant locally it reinforces their opinion. Generally though, it doesn't penetrate here."

3.2.6.3 Background Fear of a Nuclear Catastrophe

There was little real concern regarding the possibility of a nuclear catastrophe from the NPP from most of the interviewed stakeholders. Overwhelmingly the view was that the plant is well run but it also remained a little mysterious to some stakeholders. The fact that the NPP is not located in a very populated area helped to shield it from day to day awareness for most, and the fact nuclear technology is complicated seemed to deter deep analysis. Thoughts about a potential catastrophe were also mitigated by the visibility of the plant outreach efforts. For example, one stakeholder said: "my spouse doesn't have a very negative view. I don't know enough about nuclear. The possibility of a meltdown is always in the back of your mind. I know they conduct themselves very well."

3.2.6.4 Fervent Opponents

Most of the strong opposition groups have members over sixty years of age and have disliked the NPP since the start. They are of an older demographic groups where people of that generation are much more suspicious of nuclear power and see a link to nuclear weapons. They have one major advantage in pushing against the NPP: they are viewed as ordinary people with no agenda other than shutting down the nuclear plant. This is as opposed to the stakeholders who may be thought to be under pressure from the NPP. One stakeholder had this to say: "the opposition makes some pretty valid arguments. They say we know [your stakeholder group]. A lot of times, who they are is just regular people. I end up having a conversation with them at a hearing." These opponents of nuclear power can influence stakeholder management a couple different ways.

Since the fervent opponents will never be convinced that the NPP is safe, they will put pressure on both the NPP and the stakeholders continuously. Second, they are not professional organizations and may be more personal in their attacks on the NPP. This can have a polarizing effect on stakeholders where some view them as just ordinary people with a legitimate concern and some view them as a nuisance, especially when false information is brought up as a reason to shut the NPP down. Those that are professional are much more dangerous to the NPP as their arguments are more likely to be taken seriously. Depending on what is happening in the nuclear world, the plant, and in the community,

uncompromising opponents may be dismissed or have to be taken very seriously. The point is, they are always there and always trying to shut down the plant.

It is dangerous for the stakeholders to be perceived as acting in the interest of the NPP versus the ordinary people. There is sometimes a baseline suspicion on the pressure the NPP's parent company puts on the stakeholders, NPP employees, and decision makers. One stakeholder said: "A constituent [who is against nuclear power] went to the NPP. The one thing he said was he had a lot of respect for the site VP who had been assigned to the NPP. He said roughly I think [the VP] is a very responsible officer, but I don't know if the company will let [the VP do the right thing]."

3.2.6.5 NPP Past Decisions

Stakeholders felt that safety is always part of the NPP public conversation narrative. For stakeholders, having representatives from the power plant who speak one-on-one with constituents, outside of big public settings or hearings is very valuable. The NPP is required to be transparent at a federal and regulatory level, but their willingness to engage in the community constituents makes it easier for the stakeholders to work with them.

Being on the right side of certain decisions and policies has helped the NPP a lot. One stakeholder said: "there's a paradox because they've had a lot of stumbles, but they've conducted themselves [well] ... the rights of gay employees, they've been committed to addressing climate change. They didn't need to be convinced by the governor. Early on when there was a lot of climate change pushback the [NPP's parent company] was on the opposite side of that. They didn't try and deny or work against it. For my constituents that's important. There's a grudging acceptance [from opponents] and many people who think we should be doing everything we can to help [mitigate] climate change."

The idea that the stakeholders and constituents are watching the NPP's actions over time across was present in a lot of interviews. If the NPP was found to be violating environmental laws then it was assumed that they probably would be violating safety rules. Similarly if they failed to engage with the unions or provide employee benefits then they would be under suspicion in general. In short, the NPP's actions defined their character for some stakeholders. This is reflected well in the Golay-Williams model.

There has been a big change in behavior from the NPP regarding outreach and safety, and this has helped make the plant well regarded amongst the stakeholders. The stakeholders who were around

since the beginning touched on this. One said: "[back then] the banter amongst the guys was that they didn't really care about safety. I don't feel that anymore. I've seen it change over years. 15 years ago the first item on a refueling outage was the number of days it would take to refuel so they could target saving money. That doesn't make you think safety is their #1 thing. Why isn't it first? Most of the time when bringing in contractors the name of the game is to get the job done as quickly as possible. If you tell them half-heartedly that safety is important, they're going to push past that as an unclear message."

3.3 Stakeholder Realities not Captured by the Model

The stakeholder acceptance model must be concise in order to be useful. As a result, there are influences that came up in the stakeholder interviews that were not captured by the model. These types of things are noted in this section. They can be considered enrichments to the model as they appear in the causal loop diagrams.

There are two scenarios where we find that the model as described doesn't do the job:

1. Where there are further levels of details that aren't spelled out because of the conciseness requirement or because of variations that aren't captured between stakeholders.
2. If there is something incorrect about the model because the structural description doesn't correspond to what was observed. In that case we state what the discrepancy is.

These two items are at the heart of everything regarding the model's use by a public outreach person in charge of a controversial project. In the end, a conclusion can be reached from these regarding the use of the model as a guide to their own behavior and whether it can be useful. The following table enumerates the issues found in the model relative to the interviews. Detailed explanations follow in the next section.

Table 6 - Model Realities Not Captured Well

Modeling Issue	Type
Threats to Trust	Modeling Issue
Sense of Fairness Violations	Modeling Issue
Internet Slander	Conciseness Issue
Unique Details Concerning the Relationships	Conciseness Issue

3.3.1 Modeling Issue 1: Threats to Trust

Many stakeholders touched on the fact that trust can be lost quickly. If the NPP was found to be hiding something or violating safety protocols, even the most supportive stakeholders would quickly withdraw support. The fact that trust can be lost quickly makes the stakeholder relationship harder to manage. Recognizing what the threats are to trust is important but what matters more is that if trust is damaged through an episode its effects can last for a long time.

Short-term benefits can occur, for example by giving out gifts to kids at a fair or public event, but these short-term positive effects don't linger. One stakeholder mentioned that often constituents worry about the long relicensing terms issued by the NRC and commented that the NPP could theoretically be shut down at any point due to lost trust. The mechanism by which it would be shut down may vary, but the vulnerability of rapid dissolution of trust is something that must be managed carefully.

When the Fukushima accident happened, a piling on of opponents on the NPP occurred. There was also a sense of betrayal. This may be explained by the fact the NPP has run without problems and has asserted the safety of nuclear power running headlong into the uncertainty of nuclear meltdown headlines. One stakeholder said: "Fukushima, I watched with horror when that happened. That was pretty upsetting. I heard how nuclear power was not bombs, but I watched the hydrogen explosion on live television. I have a lot of friends that are anti-[NPP] activists. I didn't know what to tell them." Other organizations in the area have an impact on the trust of the NPP if they are seen as similar. For example, oil companies are known to step up and want to work with unions in the community when they have a project. Afterwards they withdraw and are no longer present. This can leave a feeling that such large companies don't really care about the community or the workers. Several stakeholders

mentioned that there would be a huge upheaval from their constituents if the NPP's parent company suddenly were to decide to cease NPP operations. The wariness of such of an event happening is difficult to model.

3.3.2 Modeling Issue 2: Sense of Fairness Violations

Fairness is at the heart of any successful human relationship and it leads to trust. When the sense of fairness gets offended, and it is hard to model, there's a huge advantage to the victim. Many going to the public forum meetings go to air grievances because they feel they have been wronged. Since the NPP has to pay for the public hearings, they are effectively paying for their opponents to try and shut them down. The suspicion of the NPP as an oppressor is a powerful narrative from those who feel wronged. How damaging and how this dynamic changes is difficult to model, partly due to incomplete information but also because the details of each case matter.

3.3.3 Conciseness Issue 1: Internet Slander

The Internet and social media have allowed a slew of commentators to enter the nuclear debate. When an accident happens or is thought to happen, many people start to comment anonymously and it is unclear who they are or what their agenda is. This is an issue that is not unique to the nuclear landscape but it can cause major damage in stakeholder dynamics.

When the Fukushima incident occurred, the social media machine went into high gear. This made it very difficult for the public to understand what was really happening. A lot of "experts" made claims that were not true. This means that the NPP has to react very strongly to such events and have the required pre-work available to respond to such events. Stakeholders are put under pressure to respond to the nuclear threat from panicked constituents without knowing the facts of what has occurred. If there are lies circulating in the midst of the chaos, it exacerbates the situation and opposition groups may pounce on the opportunity.

There are precedents to slander regarding safety issues in the community. Fake studies were done that caused fear but were eventually debunked. Since it was known who paid for the study, it made it easy for stakeholder constituents, the stakeholders themselves, and the NPP to immediately encourage a view of new claims from the same authors suspiciously. Identity attribution on social media

may improve in the future which can help mitigate misinformation spread. It is hard to model the rapidity and surge of misinformation during a catastrophe.

3.3.4 Conciseness Issue 2: Unique Details Concerning the Relationships

Stakeholders each had unique relationships regarding the NPP and the community that couldn't be perfectly modeled. The model does a good job overall but it is important for the person using it to remember that it is a template for dealing with a particular situation, but one where further thought and consideration are necessary – relationships have to be built and maintained. Several anecdotes showing the richness of the dynamics between the NPP and the interviewed stakeholders follow. The differences of the relationships are what is important.

Anecdote A: Hiring Center

The NPP does periodic refueling operations where they hire contract workers for a short time. A non-profit hiring center which receives federal and state funds to put people back to work helps fill this employment gap by supplying applicants. The NPP drives the average wage up in the community so there is always a lot of interest. People want to get in and so the hiring center has a mutual benefit of increasing its own brand recognition in the community and by fulfilling its mission. The NPP has a community foundation that provides grant money for digital literacy training. For these applicants and for the hiring center there are no concerns regarding nuclear safety. It is simply a way for them to get jobs.

As part of their partnership, the NPP will give applicants an early entrance to the event if they use the hiring center's workshop. The hiring center and the NPP have worked together to implement follow-up operations and feedback opportunities in the case of an applicant's rejection. Most applicants will not receive an offer from the NPP due to overwhelming demand, so this can both help the hiring center affect their constituents in a positive way and help the NPP to not appear cold and elitist upon rejecting an applicant. It also helps shape the applicant pool to be more in line with what the NPP is looking for.

One of the key differences from this stakeholder's perspective relative to the others' is that their constituents are looking for jobs: a tangible, life changing event that occurs on a periodic basis due to the NPP. They are not rich applicants and are looking to maintain a basic lifestyle from a valuable

employer. This process of getting jobs to a more economically depressed segment of the community can have connotations of opportunity, elitism, or mercy depending on how the process is approached. These nuances are difficult to model.

Anecdote B: Community Publications Squabbles

One stakeholder mentioned that things can get almost silly in the context that they deal with at the higher levels with the NPP. There are a stakeholder and NPP themed community publications released regularly with a requirement to present them in a format such that people are likely to keep them. A forum takes place where people choose what types of pictures to include in the publications, the county narrows it further based on the people's selections, and then it gets to the point of where it must be decided which community events are highlighted. This brings up a whole slew of political correctness issues. The stakeholder negotiated with the NPP to include Halloween which seemed innocent enough but some constituents viewed it as a pagan holiday. Easter became an issue as well since constituents complained that it is included but other religious holidays are not.

The final decisions were made between the governmental relationship staff member at the NPP and the stakeholder. What is important is that publishing community events is a seemingly small issue, but it can be a big issue if people complain. The NPP or the stakeholder could be seen as ignoring a segment of the constituents or offending others. As a result the publications only have neutral items in it. This gives an idea as to the complexity of managing how stakeholders, the NPP, and the community are perceived and how something small can become a huge problem.

Anecdote C: Chamber of Commerce

The community's Chamber of Commerce decides how much to support the NPP on a number of different levels based on the resulting economic drivers of the power plant. There is always strong business community support for the NPP largely due to the economic impact of the plant and its lack of safety incidents. The chamber of commerce provides public comment at NPP hearings and works with various legislators. The NPP's willingness to engage with them has been a big factor in improving the relationship. Sometimes an organization will not want to provide information on their activities, but according to the Chamber of Commerce, they have never had that problem with the NPP.

Businesses in the community look to the chamber of commerce for guidance because they study issues very much in depth. This is a subtle difference in the nature of their stakeholder relationships relative to others who may be forced to work with them directly due to the nature of their position (such as governmental emergency services groups), or those that might want to work with them as much as possible to benefit their constituents (such as a non-profit hiring center). The chamber of commerce does not always follow the same legislative agendas as others and this was highlighted as important to their constituents. Their approach is very objective and when they look at an issue they start with an overall view followed by pro and con arguments.

Anecdote D: Altercations between NPP Employees and Stakeholder Employees

Some government stakeholders mentioned how if there was an NPP staff member that was part of an altercation between a stakeholder's staff, the NPP would react quickly to relocate or terminate the member if they did not meet the NPP's conduct standards. This happened several times where there was an incident regarding professionalism and conflicting personalities between a stakeholder employee and an NPP employee. In one case when the stakeholder contacted the NPP and said it was a serious situation, the NPP followed up very quickly and removed the NPP employee from the situation and ultimately terminated him. This was not necessarily a case where the NPP employee was the only one at fault and it speaks to several dynamics such as the short response time from the NPP, the seriousness with which they took it, and the fact they terminated their own employee in order to maintain the stakeholder alliance. There are a number of other actions they could have taken but stakeholders regarded this action, the speed of the action, and the seriousness all as factors shaping their trust in the NPP.

Anecdote E: Public Hearing Format

The type of engagement during required hearings has changed a lot and although this part is difficult to model, it had a strong effect on certain stakeholders. The following story from a stakeholder captures this well:

> "I think that the [NPP's parent company] or any other operator has a responsibility to make sure [that] those public forums are set up to make sure questions are

answered and [make people] feel heard. There's nothing worse than just telling them they have their 3 minutes then get out of here, in any forum. What makes me buy in or listen to the [NPP's parent company] more is, and this has changed over the years, is that people feel they're a part of it. There's a difference between meetings where you have 3 minutes to speak and then the next one goes up. That doesn't feel good to me and not to anyone else either.

That's a good generalization of how meetings went 20-30 years ago. That's not the case anymore. [At] the NRC hearing they had here… there was real engagement. As people we can tell if the other side can really tell if they're feeling like they're addressed or being heard, or being dismissed. It's not uncommon for even the plant manager to stand up and say we might not have the time to answer that question but we'll be in touch after we get your name and number."

Chapter 4 – NPP Strategy and Engagement Cases

While the previous Chapter approaches stakeholder management of the NPP from the stakeholders' perspective, this Chapter approaches stakeholder management from the NPP's perspective. The research team interviewed the NPP public outreach personnel to get a sense of their strategy in managing stakeholder relationships. The NPP staff members who we interviewed are listed in the following table.

Table 7 - NPP Outreach Staff Interviews

#	Interviewee	Method	Interviewers
1	NPP Staff A	In person	G, L
2	NPP Staff B	In person	G, L
3	NPP Staff C	In person	G, L
G = Professor Michael Golay, L = Adrien Laws			

The NPP has several differentiating characteristics from most public outreach organizations:

1. The staff is very experienced in public outreach, particularly in nuclear public outreach.
2. The same public outreach staff has been in place for a long time.
3. The site VP for the NPP had experience with complex stakeholder management at a prior position in the nuclear industry. This leadership experience in different entities sharing different organizational rationales certainly helps the NPP better manage their stakeholders.

By having relationship management staffing continuity over a long period of time, the NPP has been able to recover from an initially weak position. They are currently regarded in the nuclear power industry and in the community as a success story. One NPP staff member said: "We've had a lot of continuity, I've been here [for a long time], the person before [me] was here a decade... we got clobbered hard initially, but we recovered and created our current setup."

4.1 Stakeholder Engagement Cases

The Nuclear Power Plant (NPP) has managed several major public outreach campaigns. We picked three to get a better sense of what they do specifically to manage their stakeholders under specific circumstances. These cases all involved getting sufficient stakeholder support to proceed or the NPP would be forced to shut down. The three we picked were:

1. A license renewal process.
2. The replacement of their steam generators.
3. The expansion of their nuclear waste storage.

4.1.1 Case 1: License Renewal

The NPP must have an active license from the Nuclear Regulatory Commission (NRC) [27]. Without a proper license, the plant may not operate. Licenses may be granted for up to 40 years and these licenses may be renewed for an additional 20 years [28]. The process of getting a license renewed takes years and effectively requires approval from many stakeholders. The NPP had started their license renewal process but after a well-publicized nuclear event occurred (which had nothing to do with the NPP), it changed things.

The NPP decided to try and improve the climate for successful license renewal rather than force the issue. This speaks to both an awareness of the current stakeholder climate and discipline in their outreach strategies. Stakeholders mentioned that they maintained their public outreach activity throughout this time period, particularly trying to keep a positive message about the plant and to the local community with tours and speakers at community clubs.

The discussion in the community regarding the NPP shifted towards safety from economics during this time period. The NPP performed safety studies, safety information workshops where there were one-to-one engagements with concerned constituents. There was no podium at such events. Rather, constituents were free to talk to nuclear experts about why accidents could not plausibly occur at the NPP. These meetings occurred weekly for months. The NPP brought reporters and people to the site and briefed them on safety studies and the plants safety mechanisms. The information from detailed safety studies was released publicly to allow stakeholders and constituents to analyze it themselves. Once most of the fear subsided, the NPP continued to maintain the safety outreach

messaging but began addressing the economic impact of the NPP on the local economy through economic impact reports.

4.1.2 Case 2: Steam Generator Replacement

The NPP's steam generators required replacement. Without them, the plant cannot continue functioning so it is a process that must be done when needed ensure the NPP's operation. Logistically it is a large operation that requires approximately fifty to sixty days of downtime for each steam generator. The process normally only requires approval from the Nuclear Regulatory Commission (NRC) but in this case a government commission was able to provide resistance. At the time, the existing generators had depreciated in value and this affected how much the NPP paid in taxes.

The reduced revenue was affecting the local educational institutions since they get significant amounts of funding from the property taxes of the NPP. Ultimately the NPP was forced to give up resources to a government commission in order to get approval to continue. The granting government commission board personnel are elected effectively permanently so there are fewer avenues of negotiation for the NPP. The NPP was approved and the steam generator replacement occurred without incident, but this speaks to a different kind of scenario that the NPP had to face where public outreach efforts are not as effective due to the structure of the governmental agencies.

4.1.3 Case 3: Nuclear Waste Storage

Nuclear waste is a sensitive topic for many stakeholders, mainly because of the fear generated by their constituents when talking about it. One NPP plant outreach staff member said: "People think [nuclear waste management] is direct burial like a landfill" and that protestors decry dry-cask storage as very dangerous. The NPP is forced to store nuclear waste on site due to the lack of a federal repository. They wanted to expand the capacity of their on-site dry cask storage and this required a license amendment by the NRC along with buy-in from the local community. Complicating matters at the time, there was an unrelated local crisis and the NPP's parent company was also undergoing a separate crisis. The expansion of dry cask storage was ultimately approved, but not without protestor opposition.

4.2 NPP Stakeholder Strategy Threads

Across all three stakeholder-engagement cases the NPP used common strategy threads. Two main principles underscore the NPP's public outreach strategy:

1. Using a single communicator is not a sustainable model for generating public trust.
2. The path to approval is never linear.

The following sections detail identified components of the NPP's public outreach as observed during interviews. The goal is to address safety, technical issues, economics, and the stakeholder image of the NPP. The depth and breadth of the NPP's public outreach efforts is significant.

4.2.1 Humanizing the NPP

Familiarity breeds acceptance. Humanizing the NPP is a primary goal of the NPP's public outreach efforts. The NPP staff said that the acceptance of nuclear power is highest in communities that have nuclear power plants. It is counter intuitive but proportional. Generally the closer you are to the plant, the more you support it. There are however different levels of risk acceptance by different stakeholders. Less powerful people generally tend to be more risk averse. For example, minority women of childbearing age have significantly less risk acceptance. Humanizing the plant has a powerful effect towards gaining acceptance from these types of stakeholders.

Some of the best message carriers are members of the community. NPP staff cited hairdressers in many countries as being very effective message carriers. They see a lot of people every day from across the community from different walks of life. One example of a strong humanizing messaging constituent in the local community was someone with an old safety injury working in a blue-collar job that endorses the plant as a safety leader. This doesn't count the workers themselves who carry a message just by living in the community. One in fifty members of the community work in the plant. The view within the community is that these employees are well treated.

The NPP takes many people on tours of their facility. Another ten thousand are touched every year in human one-to-one engagements. Others are reached through mail, public forums, and the web. The NPP tries to run an event once or twice a year to have community engagement. Counting all public outreach engagements, the NPP interacts with over sixty thousand people a year. They also try passive

engagement strategies like opening sections of the NPP's land for public use. The NPP opened huge sections of their land for people to hike on.

4.2.2 Tight, Model-Driven Messaging

Most of the NPP's stakeholders are not multiple issue stakeholders and tend to be single interest focused. The NPP public outreach staff said that the specific language used by the NPP matters a lot. Pre-work is key in order to get the messaging tight, but once the message has been chosen the way it is presented is typically in an advocacy method rather than a professing method. This means that the key point is presented first rather than slowly building to the point. One guiding messaging metric used by the NPP staff is the 27/9/3 Vince Covello messaging model that has been used by several prominent politicians [29]. The idea is that the human brain can only really understand 3 concepts over 9 seconds in 27 words. Any additional complexity results in the audience checking out or not understanding what is being said. The tight messaging sets the stage for a conversation and requites appetite control in deciding what should be said. It also prevents the NPP from overselling.

The NPP mentioned that during public forum meetings, oftentimes opponents did exactly the opposite. If the opponents would stop talking after a short while, they would probably gather more support, but the more they spoke the more involved and unfocused their arguments became. In these cases the NPP would often not respond directly but let the opponents essentially undermine their own arguments. However if the opponents lied then the NPP would rapidly attempt to discredit them. Every so often a fear monger would appear in the community and begin to point out higher cancer rates or other health scares that were not true.

The NPP outreach staff does a good job of being hyper sensitive and aggressive beyond the culture of their parent company to control such discussions. They said that NPP parent companies often struggle with that dynamic because the culture of NPP parent companies is typically of a certain personality type that is more deliberate and logical. By the time the parent companies react, the conversation has spiraled out of control. An example from a stakeholder: "we discovered in the news from some place out of state that radiation was discovered near the NPP. What had happened is they got the results back before [the NPP parent company] did and they posted it on their website. When we finally tracked out what happened, the levels were so minute that they were insignificant. The NPP helped us deal with that."

The NPP staff does a good job of using models to convey complex information in a small package to stakeholders and constituents. Some examples of model-driven messaging:

- It would take 140 renewable plants to make up for the NPP
- New electric cars can consume more power than a home without air conditioning
- It takes 8 square miles of renewables for 1/18th or 6% of the NPP's power production
- If all the spent nuclear fuel in the US were reprocessed and put into one football stadium, all that byproduct would fit into one end zone

4.2.3 Respectful, Low Pressure Sale

The NPP public outreach strives to be respectful and non-confrontational. They avoid contradicting people at hearings and will only step in if something is being said that is grossly wrong. They cited the Saturn dealership model as a similar type of sale. One staffer said: "We try and show how the plant fits into the grid and that our [NPP parent company] is technology agnostic. We're using what the state allows." The NPP has an education center that is very clean and accessible where they host informational sessions and begin their tours. Their vehicles used for the tour and the plant itself is very clean and well maintained. The sales pitch focuses on mitigating perceived safety threats, humanizing the plant, highlighting its economic value to the community, and gathering a coalition of supporting stakeholders. This is in contrast to the typical nuclear power sales pitch. Most NPPs try flooding a community with educational material to convince them. This sometimes comes across as being pedantic and heavy handed.

4.2.4 Getting Safety off the Table

According to NPP outreach staff, safety has to be assumed, demonstrated, and then off the table so that you can talk about the value of the power. Surveys from the NPP have indicated a reaction from people as you keep talking about safety. Reactions to talking about safety result in mistrust about safety and fear. The message the NPP strives for is that accidents won't happen here. Once sufficient "shutdown" of the safety concerns occurs, they aren't revisited unless perceptions change as with the Fukushima accident. One NPP staff mentioned: "We go backwards from an end approval and think how to do we get there?"

When a large safety accident occurs in the nuclear world or in the community, the NPP strategy is to engage aggressively to address safety concerns. One of the threats to the NPP in these scenarios

are the outspoken anti-nuclear activists who will try to make use of the heightened anxiety and fear to shut the NPP down. They have to be monitored while the NPP addresses the concerns of the stakeholders and their constituents. Once the crisis passes, the NPP's narrative can shift back to the economic and social benefits.

Stakeholders cited the fact of the NPP responsiveness as a factor in addressing safety concerns from their constituents. One said: "[the NPP's] emergency planning became a career position after [our feedback] feedback from the county. They used to rotate emergency planning rather than have a dedicated career position. The current guy has been in there for years." Another comment was: "The support we get from [the NPP to address safety concerns] is very concrete. We're always welcome to call the [site VP's] cell phone. We've never had to do that."

4.2.5 Information Distribution Hierarchy

Stakeholders are logically categorized into tiers where the top levels are contacted less frequently and the bottom is most often reached. For the high level governmental stakeholders, the NPP outreach staff spoke of an inoculation campaign strategy. The focus was on talking to them only two or three times per year and ensuring that anything they hear about regarding the NPP they hear from them first. The next tier down has employees and key stakeholders in the community, followed by the general public.

The NPP uses a range of outreach strategies. Regarding social media, due to the levels of approval required for the NPP outreach staff to send outbound message they do not engage in such conversations with people. They attempt to monitor social media and send out broadly addressed public messages on occasion. The ability of the staff to make a phone call at any moment versus having to get bureaucratic approval for social media messaging influenced their strategy. Phone calls were also cited as being more effective. One staffer said regarding social media: "Everyone's talking about us but we're not talking about ourselves"

4.2.6 Remain Economically Viable

The NPP responds not only to local stakeholders but also to its company stakeholders. In order to maintain viability of the plant, the cost per kilowatt must remain favorable. A standard practice of opponents of nuclear power is to make the cost prohibitive which puts pressure on NPP parent companies to shut down their nuclear plants. It's more common that the NPP's parent company shuts

down the plants than a governmental entity. A big reason for this is that if you can't run at high efficiency (100% output) then you still have to pay for the staff. In effect you have just multiplied your cost per kilowatt because [the NPP] is now running at low efficiency. Once the NPP is operating at a higher cost than solar and wind as a carbonless asset, the NPP parent company's management will likely shut down operations.

The NPP tries to counteract opponents by linking its economic viability to that of the community. Many examples have already been cited in this report, but one area that has not is the impact from refueling operations. Every year refueling operations bring lots of contract workers from outside the area. These workers make use of the restaurants and hotels in the area. The economic benefit of such operations is huge for the community. The hospitality business constituents bolster support for the NPP.

4.2.7 Public Acceptance Research

The NPP does research to capture the acceptance of their plant locally, in the county, and at the state level. The cost is in the tens of thousands of dollars per report. As a result they can only be done a couple times per year and the NPP outreach staff must be strategic in performing them.

Statewide about 1/3rd of the population has never heard of the NPP. A quarter have no opinion on the NPP. This is in contrast to the local city where 2 out of 3 have a favorable opinion of the NPP. The data can be correlated to the public outreach efforts. In the last year hundreds of unique news stories referenced the NPP and tens of thousands of unique web visitors went to the NPP's site. The NPP's research reveals that if the NPP has touched the constituent directly, their view of the plant being "very safe" is high and overall acceptance is very high. If not briefed or touched by public outreach efforts, the "very safe" rating and the total acceptance rating both drop significantly.

4.2.8 Public Confidence in the Regulators

Public research demonstrates that if the public has confidence in the regulator, the regulated entity (the NPP) benefits too. Research also shows that not only will some confidence in regulators result in some confidence for the NPP, but that the amount of confidence translates as well. In short, the higher the confidence in the regulator, the higher the confidence in the NPP. The NPP can point to the regulators' strength and technical competency.

However, the NPP cannot be seen as being too close to the regulators. There's often a question if the regulator is somehow funding the NPP surreptitiously. The NPP has to be careful to stay away from being perceived as being part of the regulators.

4.2.9 The Importance of Pre-Work

Having an active program rather than doing something when issues come up is a key NPP public outreach strategy. This applies in two ways: having prepared answers before meetings and stimulating active stakeholder engagements so that when incidents occur those relationships can be used immediately. An analogy is having an airplane on autopilot then suddenly jumping to the controls when an incident occurs. The context shift is difficult for stakeholders to deal with. In the NPP's stakeholder relationship management it could be devastating. The NPP's outreach staff are constantly measuring and adjusting to their environment and making predictive assessments of where the stakeholder landscape is heading. They also continuously maintain their relationships with stakeholders and attempt to "inoculate" them by being forthcoming, precise, and responsive to issues.

4.2.10 Managing the NPP Parent Company's Management

Every issue that the NPP outreach staff is managing that affects the ability to operate the plant or has an effect on earnings is communicated up to the NPP parent company's management. This includes media inquiries, of which there are hundreds every year. The NPP's parent company uses a multiyear estimate forecast planning strategy for its shareholders. This includes 1 and 5 year NPP operating strategies. Regular meetings also happen between the NPP's parent company and NPP management. The NPP's parent company may have different plans for the NPP than the NPP staff, and as a result it is important for NPP staff to maintain the relationship with their parent company and ensure smooth operations.

Chapter 5 – Conclusion

The research question asked by this report was:

> *Is the Golay-Williams stakeholder acceptance model plausibly useful to individuals responsible for success in managing stakeholder relationship on controversial projects?*

The answer to this question is overwhelmingly yes.

5.1 Model Benefits

This work is unique and important because there are certain things that the Golay-Williams (GW) model enables us to see that wouldn't be apparent otherwise. It also provides a framework for dealing with a very complex stakeholder landscape, as evidenced by the range of stakeholder attitudes and the nuclear power plant's (NPP) strategies for public outreach.

Miller's Law states that the average person can remember 7 +/- 2 things at a time [30]. The amount of things NPP outreach staff must keep track of is much more than what any single person can remember at one time. This underscores the importance of having a model or framework from which to operate. The NPP is regarded as a success story within the nuclear world in terms of public outreach efforts, and they have the advantage of a very experienced team that has been in place for a long time. The stakeholder dynamics that are natural to them are complex and not intuitive.

5.1.1 Why Stakeholder Coalitions Matter

The very complex, time sensitive, and intertwined relationships of the stakeholder coalition that keep the NPP alive emphasizes why a collation is necessary. The commitment required is significant and projects will often fail without investment in stakeholder management. The danger is that stakeholder management is viewed as a tacit marketing element of a project and not taken seriously by persons responsible for large controversial projects. At the NPP it is taken seriously, and it is quite apparent that without their sustained efforts, they would more easily be shut down.

You don't need a stakeholder coalition for regulatory reasons, for permits, financing, etc. Controversial projects are by definition controversial and in the United States political system, there exist unique dynamics that can pitch extremely damaging forces against your project very quickly. Much of the discussion and decisions concerning nuclear facilities is influenced by the political climate.

The other reason why one needs a coalition is that the threat landscape can shift rapidly. With a group of stakeholders that is willing to support your project, you are much better able to receive critical information before it damages you (as mentioned in many interviews), augment your capabilities both in resources and in skill (again, mentioned in many interviews), and be differentiated in the marketplace as a competitor who has the support of the community. The value of pre-work was highlighted in many interviews as being key to the NPP's success. One interviewee described stakeholder management as "getting out there early and fixing the roof before it rains." That is perhaps the best analogy to describe why you need a coalition. At the time you are setting up your project, the collation concept may seem excessive. But in order to ensure a long term, controversial, and expensive project's success, stakeholder engagement must be treated as a performance goal.

5.1.2 Guidelines for Setting up the Relationship

The model helps you understand how to actually set up the stakeholder coalition. That is one of its principle benefits. There are four states:

1) Setting up the relationship
2) Maintaining it
3) What to do when things get rocky
4) Decommissioning without incident

However the first and most important step is to identify why a stakeholder would support the project. In this case study, reasons that the stakeholders mentioned matched the structure of the model. For example the emergency personnel stakeholder had a general recognition of the NPP's benefit to the community. That was a positive thing for him but the thing that he really resonated on was the way the NPP gives him resources he wouldn't otherwise have. These are NPP resources he could call upon, or things they could provide to him should he have a need to do a better job. There was also the value that

he saw in working with the NPP people in terms of increasing his capabilities. When you're playing on a better team you become better. Those two things resonated as the key drivers of the relationship. As long as safety, professionalism, and other factors remained satisfactory, they were happy to work together.

If each stakeholder can be identified and placed into the model, it is a big benefit to understanding how to perform public outreach. A major advantage of the model is it gives you a way to think about stakeholder management by helping to identify particular types of stakeholders and the dynamics that may drive them rather than starting from scratch with new mental models.

5.2 Limitations

This model is not a panacea. It can be helpful but there are several limitations that should be understood. Part of this is due to the fact that Causal Loop Diagrams (CLDs) used in the GW model help you identify the most significant factors, but they are not a root cause analysis. This means that there are some cases where the model will not work.

5.2.1 Conciseness

In order for the model to be useful and relevant across different applications it must be concise. This means there are further levels of details that aren't spelled out because of the conciseness requirement or because of variations that aren't captured between stakeholders.

5.2.2 Inaccuracies

The structural descriptions can on occasion not correspond to what was observed. Significant efforts were made to ensure model accuracy, but modeling may not accurately represent the realities of the environment in some cases.

5.2.3 Irrelevance

In some places the model's relevance may be less because there isn't as much opposition. For example in the nuclear world, a lot of plants don't need to do as much work. This was likened in one interview to "being a smart kid in a bad school." Using the model in such scenarios may be unnecessary.

5.2.4 Stakeholders Not Powerful Enough

There are cases where the stakeholder relationships don't work well, despite the efforts of the people managing them. In the Cape Wind offshore wind farm project they did a great job building stakeholder relationships, but their opponent was sufficiently powerful to overcome their stakeholder relationships [31]. If the coalition that is built cannot overcome a powerful opponent, then the model's use is limited.

5.3 How the Model Should Be Used

The traditional model of stakeholder management in the nuclear industry is a failure. It involves an educational campaign that relies upon the premise that, if the stakeholders understood enough, they would support the project. You, the reader, can be much more successful by using the GW model as guide to your own behavior in stakeholder management. However, in order to counteract the limitations of the conciseness requirement of the model, there are a few things you should do to increase the chances of success.

You must map out the stakeholder landscape at the current time and attempt to map out future stakeholders and their needs at the beginning. This will be an iterative process since your stakeholder landscape will change over time as some become more or less relevant. Some stakeholders may leave entirely while others come in at different phases of the project. The key is to not only map out who the stakeholders are, but when they become stakeholders, how they become stakeholders, and what their important needs are. That will allow you to properly use the model in stakeholder relationship outreach and to better understanding your position within the community.

5.4 The Stakeholder Engagement Manual

While the work of this report has determined that the GW model is useful, there has to be a way to apply it in the field. It is not practical for a public outreach manager to become an expert in system dynamics, learn the GW model, and map out their environment all while maintaining their normal duties. They simply won't have the time and capacity, and they will lack guidance in how to best use the model. To address the gap between the realities of a job in public outreach and the value of the GW model, a Stakeholder Engagement Manual was developed.

The Stakeholder Engagement Manual contains sections on the essential elements of stakeholder engagement, stakeholder engagement development guiding principles, and recommendations for project management, among other things. It does not detail what exactly to do for a particular case, but instead it provides a method for managing stakeholder engagements. The Stakeholder Engagement Manual allows for easy application of the GW model along with focus upon its strategic and tactical benefits. An example of a section on how to recover from lost trust from stakeholders is in Table 8.

Table 8 - Needed Reactive Actions for Recovering Strong Stakeholder Relationships when it is Under Stress

Needed Actions (Reactive)	Definition	Example: Waste Isolation Pilot Plant (WIPP)
Opening & maintaining the lines of communication	The project implementer must remove all important obstacles to open communication with stakeholders – be it an individual, a mechanism, or lack of information.	WIPP's initial communications after the February 2014 incidents were typical, close, and disingenuous. However, within weeks, WIPP began conducting bi-monthly *town-hall* meetings and (almost) daily website updates which resulted in a significant improvement of relationships.
Admitting mistakes	The project implementer must quickly admit, take responsibility for, and report any important mistakes directly to stakeholders.	WIPP did not initially admit a "mistake" and was slow in informing key stakeholders. On the other hand, WIPP has not blamed anyone else for its problems. However, they did not fully take ownership of the problem until after completion of the DOE audit report(s)
Apologizing for the errors	The project implementer must be specific and sincere in acknowledging important errors and failures, as well as the effects upon stakeholder relationships.	WIPP does not appear to have issued any announcements along these lines.
Proposing a solution	The project implementer must offer specific, operational solutions to mend important damaged stakeholder relationships.	WIPP has done this, primarily through the DOE Accident Investigation Board audit reports and recovery plan (e.g., a recovery blueprint and set of expectations of WIPP to be used in order for it to reopen)
Listening to stakeholders	The project implementer must understand stakeholder concerns – including those where stakeholder relationships may be irreparable.	Other than the ongoing bi-monthly *town-hall* meetings that have occurred during 2014, there is no other indication of other ongoing efforts to engage and listen to other stakeholders directly.

5.4.1 Stakeholder Engagement Manual vs. Report Results

The observed stakeholder relationship dynamics from this report line up well with what is called for in the Stakeholder Engagement Manual [32]. The following table shows a comparison between the essential elements of stakeholder engagement called for in the manual and the dynamics captured in the field by this report.

Table 9 - NPP Efforts in the Field vs. Stakeholder Engagement Manual Essential Elements

Individual Model Phenomena (i.e. Individual Acceptance)		NPP Efforts Observed in the Field?
Personal Benefit	The advantages gained by supporting the project through the filter of individual socio-economic context	Yes
Cognitive Conception of Risk	The idea that risk perception is often a subjective judgment by stakeholders directly influenced by the level of trust they have in the project implementer to manage the project in a safe manner	Yes
Personal Framing	The way that an individual internalizes the external world and psychologically biases perceptions of reality	Yes
Trust Asymmetry	The phenomenon by which trust is difficult to earn and easy to lose while distrust is easy to gain and hard to lose (e.g. giving bad news a bigger effect on attitude formation	Yes
Local Model Phenomena (i.e. Local Stakeholder Acceptance)		NPP Efforts Observed in the Field?
Social Trust & Credibility in Project Implementer	A measure of the extent to which stakeholder groups are willing to rely on the project implementer of a specific nuclear project to make decisions in situations where the group lacks the resources to make a decision	Yes
Core Values	The fundamental beliefs of a group, a set of principles that serves as the foundation or baseline from which decisions are ultimately made	Yes
News Media & Popular Culture	The social perceptions driven by news media and popular culture that has a significant effect upon radiation attitudes and stakeholder decision making	Yes

The NPP's public outreach efforts span all of the essential elements of individual and local stakeholder acceptance present in the Stakeholder Engagement Manual. This is notable because it means that if you are a person in charge of public outreach on a new project, you can use the Manual to guide your stakeholder engagement behavior to be on par with one of the best public outreach programs in a socially controversial industry. In short, you will be much better prepared.

5.5 NPP Public Outreach Assessment

The NPP's outreach efforts are excellent. They are viewed as being professional and respected in the community from the responses of stakeholders who we interviewed. Their rapid engagement, broad one-to-one public outreach, short response times, high economic importance, modeled messaging, and attention to their stakeholders all help to support stakeholder acceptance. That said, their position in the community relies upon continued efforts and the lack of accidents. Support will wither should they face a safety incident, political impasse, or if the NPP's power production becomes unfavorable economically.

5.5.1 Areas the NPP Could Do Better

There are two areas where the NPP is at risk and needs to more effective:

1. The unsettled state of spent nuclear fuel
2. Hardline legislative demands

Looking at the model, these issues may upset stakeholder relationships. They are longer-term problems that are currently in hiatus but they may come to the forefront as the date for the license extension approaches. These issues may become particularly important if they end up constituting an impasse for the NPP's operation. The NPP public outreach team is prevented by several factors from making progress in these areas.

5.5.2.1 The Spent Fuel Problem

The federal government is required to provide a repository for nuclear waste but they have not done so due to political reasons. The NPP, like all NPPs in the United States, is effectively forced to store its spent nuclear waste on site in the interim. This could lead to shut-down for the NPP in the future should opponents be successful in making it illegal to do so. People who oppose the NPP will try to make it impossible to have a place to store spent nuclear waste and also impossible to move it.

The spent fuel problem is one where some national effort could be important. The NPP could try and improve the stakeholder relationships at the state and national level. At the state level they could try to

interact with various safety commissions. They could try to develop an interim waste storage site elsewhere, and perhaps work with agencies to set up transportation protocols.

In order to do this the NPP must apply building stakeholder relationships within the controlling agencies and within the broad political environment. We didn't see the NPP trying to do anything at this level of political effectiveness. It is a very tough situation for all NPPs (see the next Chapter for more information). The NPP's parent company may not be interested in fighting this particular problem. They may prefer to shut down the plant and pursue other power generating strategies.

5.5.2.2 Hardline Legislative Demands

Some statewide legislative bodies demand that the NPP build up certain environmental structures under the guise of environmental protection. But a separate body has committed to block approval for any such expansion. The NPP cannot proceed with operation legally if both bodies impose conflicting requirements. In such a case, the NPP would be shut down. The NPP has strong support from its community and nearby city but it lacks strength at the state level. This is again precarious ground for them to involve themselves too heavily without approval from their parent company, which may have different long-term goals.

5.6 A Comment on Changing Perceptions of Nuclear Power

There is a changing perception of nuclear power due to climate change and the attitudes of young people. Most of the hardline protestors are from an older generation that is now in their sixties. The opposition groups we studied did not have a lot of members under fifty-five and several stakeholders mentioned this during interviews.

Climate change is likely to be a huge driver in the adoption and continuation of nuclear power. If the United States becomes serious about reducing carbon emissions, it is unlikely it will simultaneously drastically reduce its power consumption. As the aging protestor demographic becomes less relevant and a new generation of less apprehensive citizens grows, nuclear power may become the staple for base load power generation. It was mentioned during interviews that young people find the plant less scary and more interesting. This could lead to changes in public outreach strategies over time. One NPP staffer said: "young ones are not nearly as apprehensive or aggressive about nuclear... this has decreased to a level our need to walk on eggshells."

5.7 Final Thoughts

The NPP discussed in this case study differentiates itself from its peers in both the depth and breadth of its outreach efforts. In this report we attempt to convey the complexities, interdependencies, and the effectiveness of the stakeholder coalition in place. Ultimately people are being affected by the outcome of the NPP project whether it is the citizens of the town, the stakeholders, or the NPP staff. The stakeholder coalition both helps and holds the NPP accountable. Not only in "holding their feet to the fire" as one stakeholder said but also in guiding them.

Even those who can never be convinced that the NPP is safe force the NPP to respond to their concerns and thereby help make the NPP as safe, as open, and as honest as possible. The NPP's public outreach staff is under a brutal spotlight. They do their jobs professionally and consistently because of their experience and longstanding commitment. The question behind our work is: how can we ensure new projects are as successful as they can be? To that end, I believe the GW model represents the future of stakeholder management where we augment experienced outreach personnel strategies with mapped out models of stakeholder management.

Chapter 6 – Addendum (State and National Engagement)

State and national level stakeholder management by the nuclear power plant (NPP) was not addressed in this report but they warrant mention. One major issue affecting all NPPs in the United States is that of the spent fuel problem.

6.1 The Spent Fuel Problem

The federal government is responsible for providing a waste disposal site for all nuclear facilities in the United States. However due to political opposition this has not come to pass and the process has been effectively stalled for decades. One of the strategies employed by opponents of nuclear power is to raise the concern regarding the storage of nuclear waste on-site at nuclear facilities. This creates angst amongst the populations living near nuclear facilities since more accrues over time without a finalized long-term storage plan.

6.2 State and National Stakeholder Engagements

States vary on their stakeholder sensitivities to nuclear power. The NPP views the state as: "our big corporate citizen in the private world, our employer." It engages statewide through legislatures and federally through nuclear bodies such as the Nuclear Energy Institute (NEI), the Nuclear Regulatory Commission (NRC), and the Institute of Nuclear Power Operations (INPO).

6.2.1 Statewide Engagement

The NPP maintains a small Washington office but it doesn't have the budget or resources to engage in a meaningful way across their entire state. They do try and maintain a relationship with a few people in key areas that benefit from the low cost power that the NPP provides. The NPP also briefs key Congressional figures as a component of their engagement moment strategy. Congressional representatives visit yearly and spend approximately 10 hours over two days with the NPP public

outreach team. It is rare to get more than 15 minutes to brief the Congress on anything, so this is a significant effort.

6.2.2 National Engagement

The NPP engages with several nationwide Nuclear Trade Associations (NTAs) in order to help shape their message at the national level and to work with them locally. The NPP relies a lot on them for national exposure, but must help them shape their message when they come to NPP's region. Sometimes NTAs have a position but it doesn't work with the local politics. NPP staff mentioned that years ago NTAs were engaging in local editorial boards on nuclear waste without appreciating the stakeholder climate. Since the NTAs are obviously pro-nuclear and they're entering a controversial topic within the NPP's community, it was not helpful. The NPP helped them change the conversation.

The NPP staff mentioned that the root-cause of this disconnect within nuclear organizations and local "help" is that the key policies are driven by nuclear officers. The feeling was if you were to perform a Meyers-Briggs test on most NTAs, 80% would be in 2 of the 16 [personality] boxes. This results in a lack of diversity of thought and a tight focus on what is needed for business execution rather than the context of their efforts.

The NPP did cite the NTAs as being very helpful in other parts of the country and in terms of the experts that they can provide. If there are emergencies, NTAs are good at providing experts to local TV stations.

6.3 State and Federal Causal Loop Diagram

Federal and regulatory stakeholder modeling in the Golay-Williams model is different from the individual and stakeholder level models expressed earlier in this report. The next page shows the causal loop diagram model of state and federal engagements. Further work is warranted to explore whether the model adequately captures the realities of the NPP's federal and state level outreach efforts.
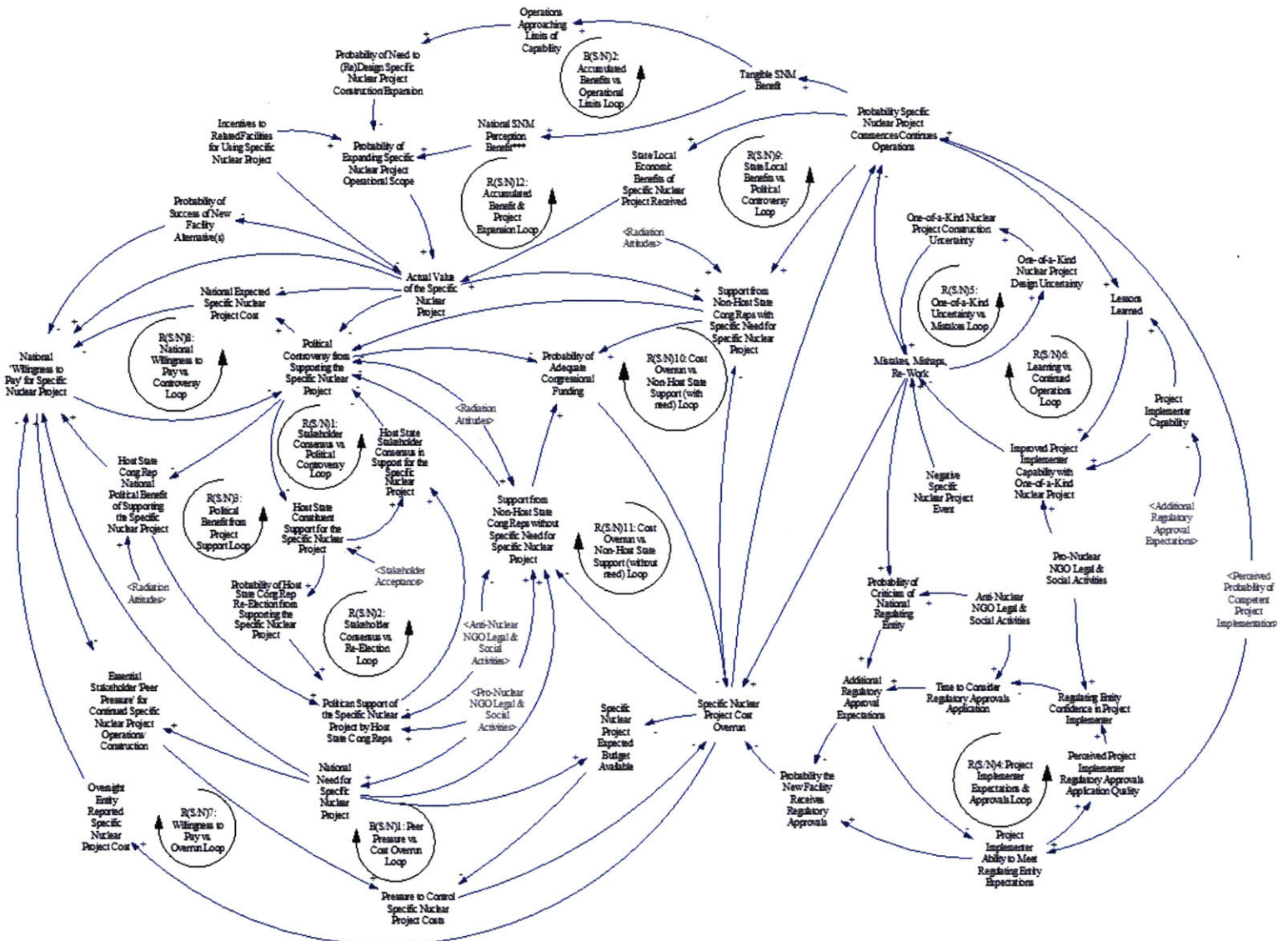
Figure 8 - State and Federal Causal Loop Diagram [24]

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