Bachelor-Thesis

- Discontinuation or Extension -

An Explorative Case Study on the Discontinuation of Interim Storage of Nuclear Waste in Ahaus, Germany

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Abstract

Discontinuation or Extension? Nuclear energy has been and is used for several decades in Germany, nevertheless, no final disposal is currently available in order to store nuclear waste (Bundesamt für kerntechnische Entsorgungssicherheit [BfE], n.d.). Since the permission of interim storage locations was initially limited for 40 years (BfE, 2019), several discontinuation processes have to come up. This study examines the discontinuation process of the interim storage facility for nuclear waste in Ahaus, with a permission until 2036 (BfE, 2017). However, until this time no final disposal in Germany will be available to store high radioactive elements (BfE, n.d.). Thus, this study answers the research question: "How do policy makers and key actors within the discontinuation process of the interim storage facility in Ahaus justify an extension or discontinuation?" Therefore, an explorative qualitative analysis is provided, including documents in form of newspapers, documents from the Federal Government, letters of involved actors, documents made available by these actors, press releases concerning the topic, as well as written statements and websites of the analyzed actors.

The analysis shows that justifications of actors regarding an extension or discontinuation, depend on their position and the context in which these are mentioned and vary between legal-administrative, security, technical or responsibility justifications. Moreover, it identifies that actors, who are against an extension, mainly base their argumentation on security justifications, in contrast to actors who argue for an extension, using legal-administrative justifications.

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List of Abbreviations

BGZ	Company for temporary storage
BI-Ahaus	Citizen initiative: "Kein Atommüll in Ahaus e.V."
BZA	Company for fuel element storage in Ahaus
CDU	Party: Christlich Demokratische Union
ESK	Entsorgungskommission
GNS	Operator for nuclear service
TÜV	Technical Inspection Association
UWG	Party: Unabhängige Wähler-Gemeinschaft

1. Introduction

Discontinuation or Extension? Nuclear energy has been and is used not only for several decades in Germany, but also in many other countries (BfE, n.d.). Until 2009, the energy generated by nuclear power plants accounted for 26.1 percent of the whole electricity generation in Germany (Statista, 2018). In addition, in October 2010, the Federal Government decided to replace the Federal Government's decision in 2002 to phase out of using nuclear energy by extending the use of nuclear energy for a longer duration (Deutscher Bundestag, n.d.). Nevertheless, a few month later, the government abruptly decided to phase out of the use of nuclear energy in 2022 due to the nuclear catastrophe in Fukushima (Die Bundesregierung, n.d.). The decision to discontinue the use of nuclear energy in Germany had and has many consequences, as this sociotechnical system has a wide range of many other sociotechnical systems (Budelmann, Di Nucci, Losada, María, Köhnke, & Reichardt, 2017). One of these are the interim storage locations for nuclear waste, which were built in order to store nuclear waste until a final disposal is available (Bundesamt für kerntechnische Entsorgungssicherheit, n.d.). The approval of interim storage locations in Germany was initially limited to 40 years, as a suitable final repository should be found by that time (Bundesamt für kerntechnische Entsorgungssicherheit [BfE], 2019). Nevertheless, the importance of interim storage locations increases, as there is still no repository worldwide currently available (BfE, n.d.).

Furthermore, also in Germany there is no final disposal available, and thus interim storage locations have to store the nuclear waste for a longer time (Nationales Begleitgremium, n.d.). The delay of this planed discontinuation process of interim storage of nuclear waste, has many consequences, not only technical and security consequences but especially social consequences, influencing many involved actors (Budelmann, et al., 2017).

Moreover, the interim storage of nuclear waste has to be postponed until a final disposal can be put into operation (Bode, Marx, & Schacht, 2017). Therefore, the discontinuation process of the interim storage facility in Ahaus will be examined in an exemplary way, by focusing on the justifications of involved actors regarding process developments within this discontinuation process.

The interim storage facility in Ahaus is one of 16 interim storage locations in Germany for nuclear waste (BfE, n.d.). Furthermore, the interim storage location in Ahaus is one of three location which are called "Zentrale Zwischenlager" (Bundesamt für kerntechnische Entsorgungssicherheit [BfE], 2018) and were built in order to store nuclear waste. In 2002 it was decided to build 13 other interim storage locations in Germany in the immediate vicinity of the nuclear power plants in order to guarantee that only a transport to a final disposal is required for these elements in the end, whereas some of the elements within the three central interim storage locations need further transports to other locations in order to prepare the elements for a final disposal (Bundesamt für kerntechnische Entsorgungssicherheit [BfE], 2016).

Operator of the location in Ahaus is the company for temporary storage [BGZ] and the company for interim storage in Ahaus [BZA] (Bundesamt für kerntechnische Entsorgungssicherheit [BfE], 2017). The location was built within the period 1984-1990 and consists of two warehouses (BfE, 2017). One of the warehouses stores high radioactive elements with a permission until 2036, whereas the other warehouse stores other radioactive substances with a permission until 2020 (BfE, 2017).

Regarding the interim storage facility in Ahaus, there are many discussions about what will happen to the nuclear waste when the permission expires. Furthermore, a permission for an extension to store additional radioactive substances was requested (BZA & GNS, 2016). Consequently, there is a discussion between various actors, the one arguing for an extension of the permission, while other stakeholders fear that the interim storage facility will become an unofficial repository for nuclear waste (WDR, 2019). For that reason, in the framework of this bachelor thesis the justification patterns will be examined, considering that no final decision regarding an actual extension for the approval of the interim storage facility has been made yet. In particular, the justifications will be identified, and, in addition, it will be examined whether there are justification patterns and how the justifications of the actors differ.

1.1 State of Research

Many scholars have already considered the delay of the process of interim storage locations within their studies, since this does not only present technical consequences, but also economic, environmental, and especially social and political challenges (Budelmann et al.,

2017). Furthermore, this topic is in most of the studies related to the aspect of finding a final disposal, to store nuclear waste in the future (Bode et al., 2017; Grundwald & Hocke, 2006; Pape, 2016). This topic is addressed in many studies, since many areas, are influenced by the extension of the permission for the storage of nuclear waste in interim storage locations, since there is no final disposal worldwide currently available (BfE, n.d.). Focusing on Germany, first of all a location should be found until 2031 before a final disposal can be constructed, which is also considered in a law, which was made for this purpose called "Standortauswahlgesetz" (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit [BMU], 2018; Reichardt, Semper, & Köhnke, 2017). However, with special focus on the discontinuation of interim storage of nuclear waste in Germany, there is no literature currently available focusing on the interaction and justification of actors within the process of an extension of the permission to store the nuclear waste beyond the current permission.

Examining existing research, regarding the governance of discontinuing a policy, by having a change in the sociotechnical system, is a topic which is most of the time related to innovations within the regime (Geels, 2002; Geels & Schot, 2007; Stegmaier, Kuhlmann & Visser, 2014). Geels (2002) for instance has developed the multi-level perspective in order to understand changes in socio-technical systems, focusing on different levels within a discontinuation process. Furthermore, Geels and Schot (2007) developed the approach of transition pathways, considering processes which can lead to a discontinuation or a delay of a changing process (Geels & Schot, 2007). In addition, discontinuation, exiting, dismantling or decreasing a policy, was already a main topic in scientific studies (Bauer, 2009, van de Graaf and Hoppe, 1996). Scholars, such as Bauer (2009) and Bauer, Jordan, Green-Pedersen and Heritier (2012), referred to a special type of policy change, including four types on how to dismantle a policy. In addition, Stegmaier and Kuhlmann (2016) developed a "ladder of discontinuation", subdivided in different steps, showing five types of a discontinuation process: control, restriction, reduction, phase-out and ban.

1.2 Research Question

Due to the importance of this topic and its impact on several levels, the discontinuation process of the interim storage facility in Ahaus will be examined. The focus on the justification patterns is particularly important, since several interim storage locations would be affected by an extension (BfE, n.d.). Analyzing the justifications of the actors concerning the topic, can further show how the topic is understood by several instances and how that

might influence the process. Thus, justifications can show how actors interact and how a process of a changing system might influence their position and behavior and vice versa how the justifications might influence the discontinuation process. Related to the discontinuation process in Ahaus, an answer to the following question will be provided:

"How do policy makers and key actors within the discontinuation process of the interim storage facility in Ahaus justify an extension or discontinuation?"

The question considers the various developments regarding the discontinuation process in Ahaus. The developments will be considered, to have a look if these influence the justifications of the actors, and if patterns can be identified within the justifications, especially considering the frames of the actors.

In order to answer the research question, sub-questions must be considered. First: "Which actors have to be considered, focusing on the discontinuation process of the interim storage facility in Ahaus?". Second, in order to identify the factors which, may have an influence on the delay of the discontinuation process, another sub-question has to be answered: "Which process developments can lead, in the case of the interim storage facility in Ahaus, to a delay in the process of discontinuation?". Moreover, the general positions of the actors will be considered, in order to see in which framework and context the actors mention their justifications. Furthermore, it will be considered, if there are justification patterns, by having a look on the justifications of the actors regarding the different process developments.

In addition, the topic of this thesis also has a special relevance for science because the results of the analysis may fill a scientific gap, regarding the idea what happens when a discontinuation process is delayed. In particular, the process and justifications of actors during such a process have not been considered yet when a discontinuation process is delayed. This research will thus be able to discover new insights on the influence of delaying a discontinuation process on the justification of involved actors, for an extension or discontinuation. Furthermore, it can give new insights for the theory approaches, especially for the approaches by Geels (2002), Borrás and Edler (2014) and Rein and Schön (1993), since several aspects of these theories will be considered in the analysis and thus can bring new insights, which can develop these theories.

Moreover, this study is also socially relevant as the analysis of justifications for an extension of the interim storage locations for nuclear waste is a topic that appeals to many instances.

Especially the argumentation is important since worldwide no final disposal is operating and thus many locations are confronted with a further extension of the permission for the storage locations (BfE, n.d.). In addition, this study could provide insights that could be transferred to other case studies to a limited extent in order to be able to analyze involved actors within a postponed discontinuation process. Furthermore, the results of the analysis can be related to a certain extent to the situation especially at the locations of the other interim storage facilities but also on other cases, concerning the interaction of actors with different frames.

The aim of this work will be to fill this scientific gap and to identify and analyze this process and the justification patterns of the actors concerning process developments, while knowing that further research can base on these and get additional insights.

1.3 Outline of the Thesis

In order to identify and analyze the justification patterns, first relevant theories and methods regarding discontinuation of policies will be considered, which can help to consider the justifications of the actors within a theoretical framework. In a further step relevant actors and process developments will be identified, considering several documents regarding the interim storage facility in Ahaus. Moreover, the research questions will be answered by analyzing documents with the help of the computer based qualitative data analysis software, “Atlas.ti”. Thus, it can be ensured that justifications will be identified, with the help of an open coding method stored in a series of Atlas.ti coding sessions. Consequently, it will be considered if there are justification patterns and further the justifications of the actors will be compared. In the end, a conclusion will be provided which will answer the research question, considering the theory and limitations of the given results. In addition, advices for further research will be provided.

2. Theoretical Framework

In order to analyze the results in the end and to answer the research question, elements of existing theories and concepts will be used, which will be discussed below. The theories and approaches will be used, in order to guarantee that the justifications will be analyzed within the context of existing theories. Nevertheless, the focus will not be on the theories, since this is an explorative study, which rather focuses on the case analysis than confirming and embedding results in the theory. Thus, the theories can help to have a certain understanding of a discontinuation process and to better analyze the documents, through a special perspective, and considering the theoretical backgrounds.

To investigate the case in a broader context and understand the complexity of the discontinuation process of the interim storage facility in Ahaus in a long-term process the multi-level perspective (MLP) of Geels and Schot (2007) will be used "which understands transitions as outcomes of alignments between developments at multiple levels." (p. 399). The multi-level perspective is subdivided into three dimensions: sociotechnical regimes, technological niches and sociotechnical landscape (Geels & Schot, 2007, pp. 399-400). In addition, these levels are related to each other and part of a "nested hierarchy" (Geels, 2002, p. 1261). As one can see in figure I. the sociotechnical system is embedded within the sociotechnical landscape and niches (Geels, 2002).

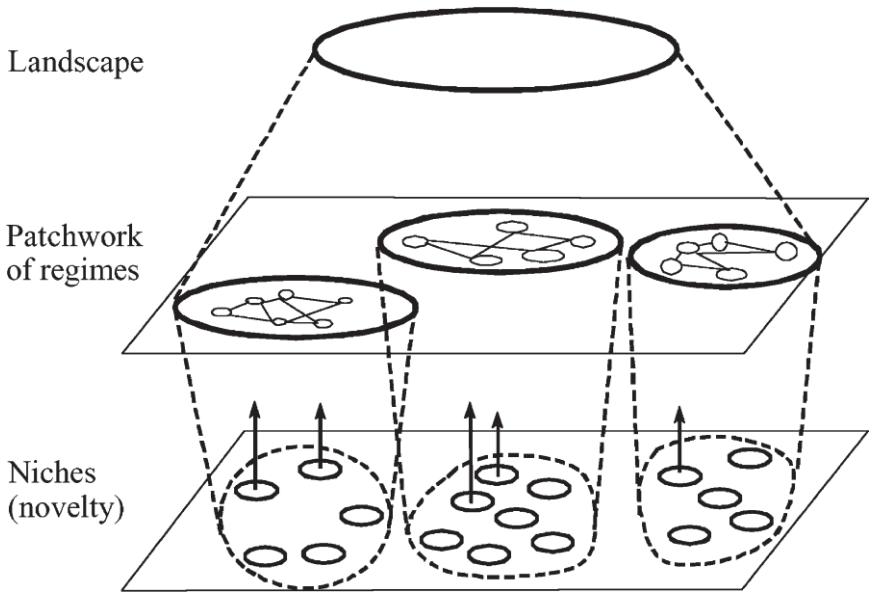

Fig. I.: "Multiple levels as a nested hierarchy." (adapted from Geels, 2002, p. 1261)

The chosen discontinuation process can thus be related to this system in order to understand how the different levels within the case interact and influence each other. Therefore, the actors can be embedded within these levels. According to Geels and Schot (2007) sociotechnical regimes consist of a "broader community of social groups and their alignment of activities" (p. 400). Geels (2002) describes sociotechnical regimes as "semi-coherent set of rules carried by different social groups" (p.1260). Moreover, Geels and Schot (2007) consider technological niches as the level where "radical novelties" (p. 400) develop which can exchange an existing sociotechnical system. In this case the innovation which lead to a discontinuation of interim storage locations is the innovation of a final storage location. Initially, it was decided that the interim storage facilities would be closed when a repository is available (BfE, 2019). Nevertheless, this process has to be postponed, so that instead of the upcoming discontinuation that was agreed an extension takes place up to an indeterminate date (Nationales Begleitgremium, n.d.). According to Geels (2018) the sociotechnical landscape "refers to broader contextual developments that influence the sociotechnical regime" (p. 225) and can be seen independently of the actors in the technological niches and regime (Geels & Schot, 2007, p. 400). In addition, Geels and Schot (2007) argued that changes at this level "usually take place slowly" (p. 400), but Geels (2018) added, that changes can also take place in form of "exogenous shocks" (p. 225) which is further explained by for instance "wars economic crises, major accidents, political upheavals" (p. 225). Moreover, changes at this level might take place in form of "cultural changes, demographic trends, broad political changes" (Geels, 2002, p. 1262). Geels (2002) adds that "Changes at the landscape level, for instance, may put pressure on the regime, and create openings for new technologies." (p. 1261). This pressure and further "tensions in the ST-regime" (Geels, 2002, p. 1262) can lead to "a 'window of opportunity'" (Geels, 2002, p. 1262), in which transitions can take place through upcoming novelties. Therefore, within the analysis it could be examined which actors can be embedded within the landscape level, in order to see, if the justifications for instance create pressure on the regime level.

Moreover, according to Geels (2011) actors need to be examined since, as he mentions transitions involve for instance "actors such as firms and industries, policy makers and politicians, consumers, civil society, engineers and researchers" (p. 24).

Referring to the discontinuation process of the interim storage facility in Ahaus, the multi-level perspective can be used in order to consider which influence the justifications might

have within a broader context and how the overall connection between regime, landscape and niche in the special discontinuation process of the interim storage facility in Ahaus looks like. In addition, the multi-level perspective, considering actors within different levels can also be related to an actor analysis, as with this approach the relation of actors within an overall system and the influence on the system can be examined.

Stegmaier, Kuhlmann and Visser (2014) emphasize that "the discontinuation of socio-technical systems appears on the political agenda whenever an actor or group of actors (a government, parliament, company or industry association, or group of countries) make a sharp reversal of direction and actively disengage from an on-going policy or governance commitment." (p. 112). Referring to the selected case, one can have a look, why the discontinuation of the interim storage location appears on the political agenda and thus can also identify which actors are involved in the process and from which level they have an influence on the process. Moreover, Stegmaier et al. (2014) refer to the concept of termination from van de Graaf and Hoppe (1996) and "see 'discontinuation' as a particular way of solving a governance problem which is the result of a changed perception and formulation of a governance problem." (p. 115). According to the chosen case, on can have a look if the justifications of the actors or frames in which they articulate their position had and have an influence in the process in a way that a change of the system would come up. In addition, the discontinuation of nuclear energy could be examined in a broader context, to see if an innovation or change would lead to a solution of the governance problem, with a special focus on the interim storage facility in Ahaus.

In order to enrich the multi-level perspective, the governmental activities within the discontinuation process will be considered, in relation to the approach from Borrás and Edler (2014). This approach provides three pillars which focus on changing governance systems (Borrás & Edler, 2014). Furthermore, these can be used in order to identify the actors within this process and offer tools for analyzing processes in changing governance systems. They distinguish between the pillars of agents and opportunity structures, instrumentation and legitimacy (Fig. II.) (Borrás & Edler, 2014).

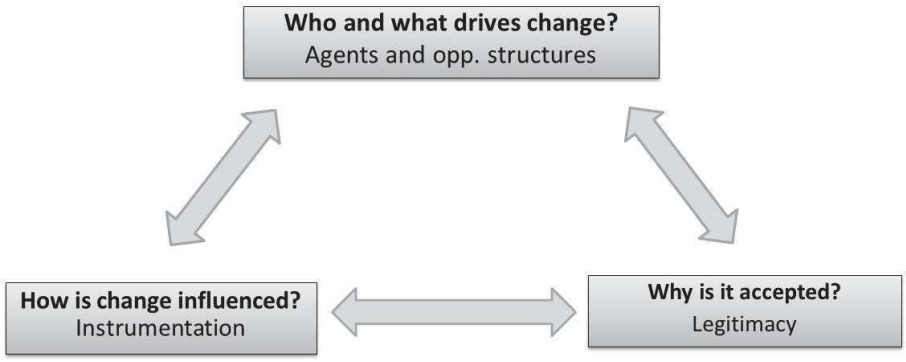

Fig. II.: "Three pillars to understand governance of change in STI systems" (adapted from Borrás and Edler, 2014, p. 25)

Moreover, the approach can be used to analyze the governance of change. According to Borrás and Edler (2014) "the 'governance' of change is the way in which societal and state actors intentionally and deliberatively interact in order to transform socio-technical systems" (p. 25). The first pillar considers the "the opportunity structures and capable agents in a system" (Borrás & Edler, 2014, p. 23). Thus, this pillar clarifies that it is important to have a look on the agents who influence the governance of change in the selected case and will be used in order to consider the involved actors. Furthermore, as they mention changes within socio-technical systems are influenced by interaction of "opportunity structures (defined by the co-evolution of new technology and knowledge with institutional framework conditions) and the actions and reactions of different agents of change." (Borrás & Edler, 2014, p. 41). In addition, Borrás and Edler (2014) like Geels emphasize "that the production and use of new knowledge/technology does not take place in a vacuum, but always in a particular social context defined by social institutions" (p. 26). Compared to Geels (2007) that can be seen within the nested character of the three levels in which novelties are embedded in the "micro-level" (p. 400). Referring to the selected discontinuation process, the replacing innovation cannot be seen independently of social institutions and one should consider which institutions are might influenced by a replacing innovation.

Moreover, Borrás and Edler (2014) point out that agents within changing systems "can be everyday agents (civil society organizations, lead consumers, non-governmental organizations, social entrepreneurs, community managers, and so on) as well as more formalized agents (policy entrepreneurs, firms, researchers, inventors, and so on)" (p. 30) and these can be distinguished by their different access to resources. Also, within the discontinuation process of the interim storage facility in Ahaus several actors are involved and

influence the governance of change, which will be identified in the following part. Nevertheless, and with regard to Borrás and Edler (2014) one must distinguish the actors by considering the resources and their influence on the discontinuation process, since the influence depends on this. The second, instrumentation pillar considers "specific ways and mechanism by which agents induce change in the socio-technical system and are able to design and give direction to that change" (Borrás & Edler, 2014, p. 31). Thus, this pillar emphasizes different tools of actors in order to initiate a change. In relation to the discontinuation process of the interim storage facility in Ahaus, this pillar could be used in order to consider the instruments, which the actors use in order to clarify their position and have an influence on the discontinuation process. Thus, not only the justifications will be considered, but further the instruments can be analyzed, which were used to influence the process. In addition, Borrás and Edler (2014) point out that a broader perspective regarding the governance instruments is needed including both "state-led policy instruments and the socially-led social agents' instruments" (p. 33) in order to understand the changing governance and further to underline the interaction of the instruments. With this they show that not only the formal actors are important while analyzing a changing process but also additional actors. With regard to Geels (2002) those additional actors can be embedded within the landscape level, pressuring the regime actors and can lead to "a 'window of opportunity'" (p. 1262).

The third, legitimacy pillar concerns "the legitimacy and democracy aspects of socio-technical and innovation systems and the process of governing their change" (Borrás & Edler, 2014, p. 24). According to Borrás and Edler (2014) the legitimatization of those systems is given if there is "wide social acceptance and support" (p. 35). Thus, this can also be assigned for changing systems (Borrás & Edler, 2014). They point out that this pillar is the most important regarding the analysis of governance during the change of those systems, since the governance of socio-technical systems has become more complex due to for instance the inclusion of several instruments (Borrás & Edler, 2014).

In relation to the selected discontinuation process, this pillar can be used in order to analyze the justifications of the actors and see how they legitimize a change within the system or a continuation of the current system.

Furthermore, the pillars will provide a better understanding of the whole governance process within the changing process. Focusing on theses pillars can thus help identifying both the

developments which should be considered and the actors within the discontinuation process and their instruments for a change of the system or an extension of the current system.

Moreover, the "ladder of discontinuation" (Stegmaier & Kuhlmann, 2016) from the DiscGo project will be considered, which helps to identify the type of a discontinuation process. The ladder is subdivided into the five steps control, restriction, reduction, phase-out and ban (Stegmaier & Kuhlmann, 2016). The steps present different intensive stages of a discontinuation process from a soft process in form of control or a hard discontinuation in form of a ban. As mentioned before, the process which will be analyzed is an ongoing process, since the discontinuation of interim storage locations will be delayed, since there is no final storage location. Therefore, the ladder of discontinuation could help to classify the process of discontinuation in Ahaus. Furthermore, the ladder can be used in the end to analyze the discontinuation of interim storage locations in a broader context, in relation to the overall topic of nuclear phase out in Germany (Die Bundesregierung, n.d.).

The transition pathways from Geels and Schot (2007) will be examined, which consider the interaction of the three levels of the MLP and further represent ways in which a transition can take place. They distinguish between the four transition pathways: transformation, de-alignment and re-alignment, technological substitution and reconfiguration pathway, considering the timing and nature of interaction of the levels (Geels & Schot, 2007). These will be examined in order to understand how in the selected case the various levels influence each other, and which transition pathway can be best assigned to the case. Moreover, one can see which of the three levels might change in order to create "windows of opportunity" (Geels & Schot, 2007, p. 400) which lead to a transition of the system.

According to Geels and Schot (2007) the transformation path faces the case, in which there is pressure from the landscape on the regime, even if there is not enough developed novelty that would lead to "reorientations by regime actors" (p. 406). Since novelties are not complete developed these do not profit from upcoming pressure of the landscape level on the regime level (Geels & Schot, 2007). Thus, the innovations do not lead to a change of the current system. The de-alignment and re-alignment path consider the transition in a way that here the pressure on the regime level by the landscape level is "divergent, large and sudden" (Geels & Schot, 2007, p. 408) which "leads to de-alignment and erosion of the regime" (Geels & Schot, 2007, p. 408). Also, here novelties within the niche level are not enough developed in order to replace a current system and "*multiple* niche innovations (…) co-exist and compete for

attention and resources" (Geels & Schot, 2007, p. 408). This leads to uncertainty since there is not one innovation which can replace the existing system, but an unstable existence of several innovations (Geels & Schot, 2007, p. 408). In contrast to this, niche-innovations can replace the existing system if the innovation is stable and there are "windows of opportunity" (Geels & Schot, 2007, p. 400). But the technological substitution pathway shows that there must be landscape pressure in order to create such "windows of opportunity" (Geels & Schot, 2007, p. 400).

The reconfiguration pathway considers a regime change in which the old regime develops into a new regime, by adopting "Symbiotic innovations" which "are initially adopted in the regime to solve local problems" (Geels & Schot, 2007, p. 411). Nevertheless, this leads also to a change of the basic structure of the regime (Geels & Schot, 2007, p. 411).

The transition pathways will be considered in the analysis in order to understand which levels might could influence the discontinuation process in a way that a discontinuation or extension will come up. Further the transition pathways can explain why there is currently a delay of the discontinuation process of the interim storage facility in Ahaus, considering the interaction of the different levels within the MLP. Therefore, within the analysis the pathway of the selected case can be identified, and it can be analyzed how the process developments influence the changing system.

In order to examine the frames and influence of these on the justifications of the involved actors, the framing approach by Rein and Schön (1993) will be considered. Rein and Schön (1993) explain the term framing as "a way of selecting, organizing, interpreting, and making sense of a complex reality to provide guideposts for knowing, analyzing, persuading, and acting" (p. 146). They add that framing occurs "at three levels: personal life, scientific or scholarly inquiry, and policy-making" (Rein & Schön, 1993, p. 146) which "must be related to each other" (p. 146). Thus, frames differ among people, which leads to several understandings of the world. Rein and Schön (1993) consider this as "problematic" (p. 147) since consequently this "creates multiple social realities" (p.147). Therefore, on should focus in the selected case at these three levels to see how these affect the position of the actors and their frames.

The approach assumes that various actors interact in a "policy discourse" (Rein & Schön, 1993, p. 145) in which „problematic situations are converted to policy problems, agendas are set, decisions are made, and actions are taken" (p. 145). Since frames are not something static

and can also be covered while formulating a position, it is hard to distinguish within a policy discourse, which frames lead actors, and their position (Rein & Schön, 1993, p. 151). In the discontinuation process for the interim storage facility in Ahaus, there is also a political discourse on whether to extend the permission or not. In addition, this process is influenced by various developments, which can also have an impact on the frames and indirectly influence the justifications of the actors for an extension or discontinuation of the interim storage location.

Furthermore, frames should not be interpreted without considering the person to which it is connected (Rein & Schön, 1993, p. 151). Rein and Schön (1993) point out that a comparison between actors and their attitudes, in a political discourse is difficult if they frame the reality differently, since then it is no longer clear on which topic the actors are discussing. They suggest that framing must always be seen within a context and assume that the frames may change if the context in which they are embedded changes (Rein & Schön, 1993, p.155). Moreover, they distinguish between four contexts: internal context, proximate context, macro context, global shifts of context (Rein & Schön, 1993, pp. 155-156).

The internal context refers to temporal changes due to “replacement of its personnel, its sponsors, or its clients” (Rein & Schön, 1993, p. 154). The proximate context considers reframing related to changes within the policy environment, in which programs interact (Rein & Schön, 1993, p. 154). In addition, the macro context considers “changes in the directions of policy, changes in the institutions designed to carry out policy, realignment of party politics, and economic fluctuations” (Rein & Schön, 1993, p. 154-155). Moreover, the global shifts context “involve changes at the broadest level of public context, including changes in the historical eras in which reframing of policy issues may occur” (Rein & Schön, 1993, p. 155). Referring to the chosen case, one can thus take into account the influence of the changes within the process on the frames of the actors.

In order to examine the various justifications, the context must also be considered, in which the arguments are expressed. Contexts can be, for example, a political, public or internal context (Rein & Schön, 1993). Thus, the internal reasoning can be clearly distinguished from the public argumentation of an actor. Rein and Schön (1993) point out that policy discourse may differ depending on the forum (public or policy) and on the context in which it occurs. For instance, the interpersonal context refers to the “behavioral world” (Rein & Schön, 1993, p. 156) of an individual in which a discourse arises. Thus, individuals have during a

conversation a parallel reflection on how talking to the other conversation partner (Rein & Schön, 1993). In addition, within the institutional context individuals have to seek for confirming with the given institution's norms, in which the discourse is nested (Rein & Schön, 1993). Furthermore, if a discourse is within a public context, it uses "public forums" (Rein & Schön, 1993, p. 157) which "serve as institutional vehicles for policy debate" (Rein & Schön, 1993, p. 157). Moreover, Rein and Schön (1993) add that within a policy forum remarks of individuals should be seen separately of their inner position.

Subsequently, this approach can help to identify the frames of the involved actors, to better understand and analyze their justifications regarding an extension or discontinuation of the permission for a further use of interim storage locations. Moreover, this approach pointed out to consider the situations and changes within a discourse, by having a look on the frames, since these might change for instance due to process developments.

Concluding, these approaches can help to analyze the justifications, considering the existing literature and concepts concerning discontinuing a policy. The multi-level perspective by Geels (2002) will be examined to implement the actors within a broader system. Thus, one could consider their position within the system. In order to identify the involved actors and their position within the system the approach from Borrás & Edler (2014) will be used as a supplement to that approach, to consider the instruments of the actors and how these affect the legitimization of their justifications and behavior within the multi-level perspective of this changing system. Moreover, the framing approach by Rein and Schön (1993) will be examined when focusing on the justifications and framings by the actors concerning the developments. After analyzing the justifications of the actors and their position and influence within the system, the approach by Geels and Schot (2007) will be used to analyze which transition pathway most likely represent the discontinuation process of the interim storage facility in Ahaus, or if there is a need to develop this approach. This approach further gives an overview of the process which can be embedded within a broader context, concerning the topics nuclear energy, the phase-out of using nuclear energy and the interim storage of nuclear elements.

3. Research Design and Methods

In order to explain how policy makers and key actors within the discontinuation process of the interim storage facility in Ahaus justify an extension or discontinuation, an explorative case study will be used, to consider and analyze the justification patterns of involved actors.

3.1 Data Sampling

As a method a qualitative in-depth analysis of documents will be provided. Documents were collected in form of newspapers, including statements and interviews with the chosen actors, documents from the Federal Government, examining topics regarding the interim storage facility in Ahaus, letters of actors, in which justifications were mentioned regarding developments concerning the interim storage facility in Ahaus, documents made available by the actors, press releases concerning the topic, as well as written statements and websites of the analyzed actors. All documents and statements were searched with the help of specific criteria and key words. Key words were for instance: interim storage facility, storage location in Ahaus, nuclear waste in Ahaus, nuclear energy, statement interim storage facility Ahaus, permission storage location in Ahaus, transports to the interim storage facility in Ahaus, takeover of the interim storage facility in Ahaus by the Federal Government, extension of the permission for the interim storage facility in Ahaus. Moreover, specific criteria were used in order to find valid documents, for instance: the documents are written or made available by a recognized actor, newspaper, organization, no violation of private data, and statements were approved by the actors them self for instance in an individual meeting, or by repetition in other contexts.

Furthermore, 324 documents were collected from the period 2011-2019. This period from 2011 was chosen since 2011 was an important year within the context of the use for nuclear energy, because in this year the decision was made for the nuclear phase-out in Germany (Die Bundesregierung, n.d.). This had also an indirect effect for the interim storage locations in Germany, since there is no final disposal for nuclear energy in Germany currently available and all fuel elements have to be stored in interim storage facilities until a repository goes into operation (BfE, n.d.). As a result of the nuclear phase out in 2022, the production of nuclear waste in Germany was significantly reduced, which otherwise would have to be stored in interim storage facilities (Die Bundesregierung, n.d.). Furthermore, within this time period, developments were identified which are highly important when analyzing the justifications of

involved actors regarding the discontinuation or extension of the interim storage facility in Ahaus.

3.1.1 Actors

The actors to be included in the analysis were identified in the documents and further selected according to the following criteria: most occurred in the documents with regard to the interim storage facility in Ahaus, direct relation to the extension of the interim storage facility, recognized as an institution, organization or actor who is involved in the discussion for an extension of the approval for the interim storage facility in Ahaus. It was ensured that from each area an actor is considered so that one can analyze the reasoning and the different frames and contexts. Moreover, both governmental institutions and private organizations were considered. Due to the limitations in form of time and words not all actors can be examined in such a qualitative in-depth analysis, for example, the justifications of citizens, other interest groups, countries and authorities, except for those selected, will not be considered. Actors who were identified and will be considered in the analysis are the municipality Ahaus, a citizen initiative against nuclear energy in Ahaus, operators of the interim storage facility in Ahaus, including the former operator for nuclear service [GNS], the company for temporary storage [BGZ] and the company for fuel element storage in Ahaus [BZA], the Federal Government in form of the [BGZ] and the local associations of the parties CDU [Christlich Demokratische Union] and UWG [Unabhängige Wähler-Gemeinschaft].

In addition, in discussions with the deputy of the city of Ahaus, a founding member of the citizens' initiative against nuclear waste in Ahaus, as well as the press officer of the interim storage facility in Ahaus, impressions from the documents were confirmed, background questions were clarified, and it could be ensured that the justifications of the actors were correctly understood. This offered the opportunity to get additional material that was not online available. It should be added that this was an open discussion and no transcript was made in order to guarantee that the actors could answer more open and were free of pressure, due to a possible publication of their answers. Nevertheless, the focus within the analysis will be on the documents, since this can guarantee that the justifications of the actors, will be examined within the discontinuation process. If the focus would be only on an interview it would be harder to identify the justifications of the actors within the process, since than the interviewee could influence the justifications in a way that this would confirm better with the present argumentation regarding the analyzed process developments.

The understanding of the justifications could thereby be confirmed based on an oral discussion of the actors, by taking part in a discussion on the application for renewal of the permission for the interim storage of low and intermediate level radioactive waste in June 2019. At the appointment statements by the actors were presented, as well as justifications by the actors for or against the requested extension of the permission to store those elements in the facility in Ahaus. In attendance were, among other some plaintiffs mainly members of the civil initiative against nuclear waste in Ahaus, the press officer of the BGZ, the mayoress of the city of Ahaus and the first alderman, the applicant [BGZ] and the government of Münster as the authority deciding regarding the approval. Since this appointment was only partially public, it is only possible to consider the statements and justifications, in form of documents, from the public part of the event. Nevertheless, the statements and arguments from the nonpublic part were used in order to see if the justifications were understood correctly.

3.1.2 Process Developments

In order to elaborate the justification patterns of the individual actors regarding an extension or discontinuation of the interim storage facility in Ahaus, certain process developments will be taken into account in which the justifications of the individual actors will be identified and subsequently analyzed. In addition, the justification patterns will be finally compared, considering the frames in which the actors act.

The developments that will be considered have been identified as most important in the documents and in the media, when considering a possible extension of the interim storage facility in Ahaus, taking into account the missing option of a final disposal for nuclear waste.

Furthermore, the actors refer in statements, previous conducted interviews for instance with the newspaper, and requests in particular to these process developments. Since not all process developments, referring to the interim storage facility in Ahaus, can be examined, the focus is limited to the developments in the period 2011-2019, as within this period developments are embedded that could influence the extension of the interim storage facility in Ahaus. Not only the justifications of the actors for the individual developments will be examined, but it will be also considered whether individual developments have changed the justifications of the actors, in particular with a focus on the extension of a permission for the interim storage facility in Ahaus.

Process developments which were identified in the documents as important and which will be considered in the analysis are the takeover of the interim storage facility in Ahaus by the Federal Government (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit [BMU], 2017), the construction of an additional wall around the interim storage facility (BGZ, n.d.), transports of elements from Jülich and Garching (BGZ, n.d.) as well as the request for an extension of the permission for the storage of additional radioactive substances (BZA & GNS, 2016).

3.2 Limitations

One should note that the data used in this study are existing documents, statements, press releases, interview transcripts which means that one cannot influence the quality of the documents, so that not all documents explicitly focus on the issue, but have been created for other purposes (Flick, 2009, p. 222). This risk was minimized by deliberately selecting the documents with the help of the mentioned criteria. Thus, in some documents a connection must be deduced to the justification regarding discontinuation or extension of the interim storage facility in Ahaus.

Potential threats in a case study could be that one cannot generalize the results of the analysis on every other discontinuation process. Nevertheless, one can generalize the results on certain levels. First, the different justifications of the actors, concerning the process developments will be compared and further these will be considered in an overall context. Secondly, the justifications of the actors will be examined in which specific patterns or frames will be identified. And thirdly, the case study may come to new insights that can broaden the knowledge of previous theories, since it can give new insights for the approach by Borrás and Edler (2014) and the understanding of the MLP by Geels (2002) and Geels and Schot (2007) or the framing approach by Rein and Schön (1993). Furthermore, the qualitative research of the individual actors allows a precise data analysis. In addition, coding can be used to prevent that the individual documents are analyzed on different aspects so that they can be compared, and changes identified and analyzed. As a result, the reliability can be strengthened, since the process becomes traceable by assigning codes to individual text passages.

3.3 Validity and Reliability

In order to check if the method and data analysis are valid and reliable, different steps were taken. Validity should be achieved by focusing on justifications in documents, within a time

period of nearly ten years. Furthermore, the content and intention of the justifications were verified in further discussions with the actors, in order to guarantee that there is a properly understanding of the justifications for the analysis part. Referring to Flick (2009) this presents "Member-Checks" (p. 273), which can be used in order to make the results more valid.

Reliability is guaranteed, by a detailed description of the research procedure, to make the process comprehensible. Only the justifications from the documents will be considered in the analysis, thus it can be ensured that even if another one would do the analysis, the same data would be available, in contrast to focusing only on interviews, where answers at different moments in time could deviate.

3.4 Data Analysis

In order to analyze the data a thematic analysis inspired by Braun and Clarke (2006) will be provided, which offers the possibility to analyze a large number of documents in a qualitative explorative way, with the help of codes and categories for structuring. Thus, patterns can be identified within the documents, in order to analyze the meaning of specific text passages (Braun & Clarke, 2006). Braun and Clarke (2006) offer therefore six phases, to do a thematic analysis. In the following section the procedure of the data analysis will be described with reference to the phases mentioned by Braun and Clarke (2006).

To identify the justification patterns and to analyze these in the end, a computer-aided data analysis named "Atlas.ti" was used, which helps to organize a qualitative data analysis of documents. Atlas.ti offers the opportunity to make the data analysis process feasible, in a way that one can see the steps during the process of the analysis. At the beginning, the documents, which were chosen in order to answer the research question were uploaded in this system. Afterwards all documents have been read and first notes were added, referring to Braun and Clarke (2006) this presents phase one. As a next step an open coding method was used in order to make the justifications of the actors comparable. During the open coding procedure important text passages for answering the research questions were marked. Furthermore, codes were created, consisting of a word, or a short explanation in order to structure the documents and justifications within the analysis. Thus, one can compare the justifications of the involved actors regarding a specific topic and the overall mentioned justifications of an actor. Moreover, additional codes were applied, in order to structure the text passages which,

gives additional background information regarding the topic. Referring to Braun and Clarke (2006) this step represents phase two of the thematic analysis.

As the codes and relevant text passages were examined, categories were identified and text passages were added which are related to the specific code, representing phase three by Braun and Clarke (2006). Subsequently, the codes were sorted into networks, so that an overview could be made, and it could be checked whether the combination of codes, categories and text passages fit together. Furthermore, in an additional word document, the justifications were listed to create a map, considering the codes, categories and text passages. This represents the phase four, referring to Braun and Clarke (2006).

In the analysis part the codes will be described more precisely, and an explanation of the most important identified codes will be provided, representing phase five by Braun and Clarke (2006). Moreover, the meaning of the codes will be referred to the actor's understandings and justifications on these codes. Subsequently, based on the codes and justifications the analysis of the justification patterns will be elaborated with special consideration of the actor's frames. Thus, the analysis will focus on the most important text passages in order to answer the research question considering the relevant theories and literature on that topic representing the last phase within the thematic analysis (Braun & Clarke, 2006).

4. Analysis

First, in order to analyze the justifications regarding an extension or discontinuation, the sub-questions will be answered, to explain why the chosen actors and process developments are important considering the discontinuation process of the interim storage facility in Ahaus. As a next step the meaning of the most important codes will be explained, which made the documents comparable. With the help of the codes the justifications of the actors were identified, and it will be compared, which type of justification the actors use for their position. Moreover, the actor's position, types and categories of justifications will be related to the multi-level perspective.

In the introduction two sub-questions were asked: "Which actors have to be considered, focusing on the discontinuation process of the interim storage facility in Ahaus?" and "Which process developments can lead, in the case of the interim storage facility in Ahaus, to a delay in the process of discontinuation?". Already in the methodology part, the actors and development processes were mentioned, which were identified in the documents. In this part it will be examined, why these are important, when focusing on the discontinuation process of the interim storage location in Ahaus.

4.1 Actors

Referring to Borrás and Edler (2014), actors have to be considered when examining the governance of change. They mention that actors within changing systems "can be everyday agents (civil society organizations, lead consumers, non-governmental organizations, social entrepreneurs, community managers, and so on) as well as more formalized agents (policy entrepreneurs, firms, researchers, inventors, and so on)" (Borrás & Edler, p. 30).

Also, within the discontinuation process of the interim storage location in Ahaus several actors are involved and influence the governance of change. One of the chosen actors is the municipality Ahaus. The city administration will be examined, as the authority having a contract with the company for temporary storage [BGZ] concerning the settlement of the interim storage facility in Ahaus (Stadt Ahaus, 2018).

Furthermore, the municipality will be also considered in connection to the city council. In addition, a citizen initiative against nuclear energy, especially against the storage of nuclear waste in Ahaus will be considered, called "Bürgerinitiative „Kein Atommüll in Ahaus"

(Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). In particular, the initiative is against any expansion of the interim storage facility in Ahaus (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). The initiative is active since 1977 (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). Moreover, the initiative is not only active on a local level, but also works together with other organizations, at the national as well as international level (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018).

Furthermore, the operators of the interim storage facility, including the former operator for nuclear service [GNS], the company for temporary storage [BGZ] and the company for fuel element storage in Ahaus [BZA] will be considered regarding an extension of the permission. Especially the BGZ is one of the most important actors considering the discontinuation process in Ahaus, as the BGZ presents the applicant within the approval procedure for a permission of an extension for the warehouse, storing additional nuclear substances (BZA & GNS, 2016). Nevertheless, it should be examined that justifications, related to this request, are somewhat limited for considering the overall extension of the interim storage facility, since there is a subdivision of the location in two warehouses (BfE, 2017). Subsequently, the Federal Government as an indirect operator of the interim storage facility in form of the BGZ should be investigated, due to the former mentioned aspects. Moreover, the local association of the parties CDU [Christlich Demokratische Union] and UWG [Unabhängige Wähler-Gemeinschaft] will be examined. This both parties will be considered since these were identified within the documents as the most important parties within the council, regarding discussions concerning the interim storage facility in Ahaus.

The UWG, as the party which was founded within the protest against the interim storage location in Ahaus, in order to represent their interest regarding that topic within a political forum (Unabhängige Wählergruppe Ahaus [UWG], 2016). Moreover, the CDU needs to be considered since, the decision for an interim storage location in Ahaus was mainly supported by the CDU (Fasel, 2004).

4.2 Process Developments

4.2.1 Takeover Federal Government

One process which was identified as important in the documents is the takeover of interim storage locations in Germany from a private operator by the Federal Government (BMU,

2017). Since a new operator, can be also related to new requirements and conditions, this could have an influence on the justifications of the actors. Nevertheless, the documents and discussions with involved actors showed that the takeover by the Federal Government did not change the position of the operator towards decisions concerning transports or a permission since these are regulated by law. Thus, this development, will not be further considered within the analysis.

4.2.2 Construction of an Additional Wall

Another process which was identified as important is the construction of an additional wall (BGZ, n.d.). This development of the location is related to the decision regarding an extension of the location since first an additional wall can be examined as an extension of the current interim storage location, even if not directly, but in a symbolic way this leads to a further consolidation of the building.

This process development is one of the most discussed aspects within the discussion regarding an extension of the location. Background of the construction of the additional wall in Ahaus was a decision from 2010, in which the Federal Ministry for the Environment decided to upgrade the security of interim storage facilities in Germany (BMU, 2017). This decision was taken to ensure that the interim storage facilities take the necessary measures, according to the state of science and technology, to ensure the safety of interim storage of nuclear waste (BMU, 2017). In addition, all nuclear facilities should be adequately protected against accidents and impacts of third parties, including measures against terrorist attacks (BMU, 2017). Details of these measures should be kept secret in order to prevent offenders from using the information for attacks (BMU, 2017). In addition, on the 8th of February 2016 the interim storage location is Ahaus was given the permission for the necessary update, including the construction of an additional wall and kerosene drains (GNS, 2016).

4.2.3 Transports of High-Radioactive Elements

The transports from Garching and Jülich will be considered since these were and are currently controversy discussed by the involved actors within the analyzed time period. In addition, transports can create an indication of an extension, considering that there is no final storage currently available, which could store the elements, when the permission for the facility in Ahaus expires (Nationales Begleitgremium, n.d.). Thus, the storage of further elements can increase the importance of the location in Ahaus, since elements have to be stored in interim

storages until a final storage location is identified and goes into operation, and further unnecessary transports have to be prevented due to the § 8 Radiation Protection Act.

4.2.3.1 Jülich

Transports from Jülich to Ahaus would include 152 elements from a former experimental reactor (Jülicher Entsorgungsgesellschaft für Nuklearanlagen [JEN], n.d.). These elements have to be transported (JEN, n.d.), since the permission for the location expired in 2013 (BGZ, n.d.) and was not renewed due to missing measures for earthquake protection (Die Landesregierung Nordrhein-Westfalen, n.d.). In 2014 the responsible ministry was instructed to bring the elements directly in another interim storage location, considering the need of a permission for the storage and transport of the elements (BGZ, n.d.). In order to guarantee a further storage of the elements three options are currently considered (BGZ, n.d.). The options are "a transport of the elements in the USA, the construction of a new interim storage location in Jülich and a transport to the interim storage location in Ahaus" (BGZ, n.d.). On the 21th of June 2016 the permission was given to store the elements in the interim storage facility in Ahaus (BGZ, n.d.). Nevertheless, this decision was complained by the council of Ahaus (Stadt Ahaus, 2016). Moreover, until now no decision has been made, to which storage location the elements will be transported (BGZ, n.d.).

4.3.2.2 Garching

The transports from Garching to Ahaus would include 21 elements from a research reactor (BfE, 2017). These were enriched to 93 percent and thus are high radioactive (Technische Universität München, n.d.). In 2014 the operator of the interim storage location in Ahaus had resumed the procedure for a permission to store these elements in Ahaus, which was already applied for in 1995 (BfE, 2017).

4.3.3 Extension of the Permission for Low- and Medium Radioactive Elements

Furthermore, the request for an extension of the permission to store low- and medium radioactive substances will be considered, since a decision for an extension would have a direct influence on the extension of the interim storage location in Ahaus (BZA & GNS, 2016). Thus, this process development is one of the most important, related to the analysis of the actor's justifications regarding an extension of storing elements in Ahaus. In addition, this

request was highly discussed in the documents, since the justification, for or against an extension are very controversial, which will be considered in the following part.

4.4 Categories and Codes

Within the process of the analysis, 49 codes were created in order to structure the documents and make them comparable. Regarding the research question four categories and eleven codes were identified as most important to focus on the justifications of involved actors. The following section describes which categories and codes were implemented and what they mean. It should be mentioned that also the actors and process developments were structured with a code, to relate them in networks with the other codes to create maps, showing the justifications of all actors, regarding a specific point.

4.4.1 "Extension of the Permission"

"Extension of the permission" is one of the most important categories for the analysis of the justifications of the actors, since justifications related to this category, refer to an aspect, which is directly connected to a delay of the discontinuation process (BZA & GNS, 2016). This category is subdivided into the codes "High radioactive elements" and "Additional nuclear substances". This division is important, since the location consists, as previously mentioned, of two separated warehouses, which have their own permission (BfE, 2017). Thus, this needs to be considered, by having a look on the justifications of the actors.

4.4.2 "Final Disposal of Nuclear Waste"

Furthermore, the category "Final disposal of nuclear waste" was identified, consisting of two codes: "Schacht Konrad" and "Final disposal for high radioactive elements". This differentiation is needed since there is a clear distinction between these types of final storage locations. The purpose of final disposals is to guarantee a permanent storage of nuclear waste, in relation to Germany, this will be done under the earth (BfE, n.d.).

"Schacht Konrad" is a final disposal for additional nuclear substances, including low- and medium radioactive nuclear waste (Bundesgesellschaft für Endlagerung [BGE], n.d.). The permission was granted in 2007 (BGE, n.d.). An initial commissioning of this final disposal was planned for 2013 (Schrammar, 2008). Nevertheless, this has been delayed further and is now scheduled for 2027 (BGE, 2018). Thus, the interim storage location in Ahaus needs a

further permission to store additional nuclear substances, since the existing permission to store those elements is limited until 2020 (BfE, 2017).

In contrast to this there is no final disposal for high radioactive elements worldwide available (BfE, n.d.). Finland, however, is building the world's first final disposal, to store high radioactive elements from 2020 onwards (Geiger, 2018). Focusing on Germany, a decision was made in 2013 to search for a suitable location to build a final disposal, considering every potential location in Germany (BMU, 2018). The location for a final disposal in Germany should be found until 2031 (BMU, 2018), so that the construction of the disposal can be started in order to put this in 2050 into operation (Rieger, 2019). In addition, the final disposal should then guarantee a safe storage of high radioactive elements for a period of one million years (BMU, 2017).

The category is particularly important considering the justifications of the actors, since the current permission is limited to 40 years (BfE, 2019). Moreover, it was specified in the Atomic Energy Act that the nuclear energy can only be produced if there is a possibility to store the fuel elements. Since previously and further currently there is no repository available worldwide, one is dependent on interim storage locations (BfE, n.d.).

4.4.3 "Security"

"Security" as a third category, is subdivided into the code's: building, transport, health, and legal acceptance. This category is important, since in most of the justifications the actors refer to security aspects, when arguing for or against the extension of the permission to store nuclear waste in Ahaus, beyond the current permission. Moreover, the security of the interim storage location in Ahaus, is requirement for a further extension (BfE, 2017). However, the subdivision regarding this category significant, since the actors refer to different aspects of security.

One implemented code, within the category is "Building". This refers to the security of the constructed building, consisting of two warehouses. With focus on the justifications of the actors, this code was used, in relation to the construction of an additional wall. In addition, the code "Transport" refers to all security aspects, related to transports of nuclear waste from one storage location to another. Moreover, the code "Health" refers to all security aspects, concerning health-related aspects, as for instance contamination, diseases, negative environmental impacts, or long-term-effects on genetic heritage. In addition, the code "Legal

acceptance" considers security aspects by legal guidelines and requirements for instance related to conditions of the building, or limit values for the radiation exposure of the environment, or requirements for a safe transport. Thus, this code includes all security aspects related to a legal framework.

4.4.4 "Technical Argument"

The fourth category "Technology" includes the codes: elements, packaging of elements, and storage conditions. Considering the justifications, one will see that this aspect, is also very important for some actors, considering an extension of the permission, since technical requirements have to be fulfilled, to guarantee a safe storage (BfE, 2017).

The code "Elements" refer to the conditions of the elements. This code is somehow also related to the category security, since these aspects influence each other. Another code is "Packaging of elements", this refer to the technical condition of an element, in order to store this in a final disposal. Furthermore, the code "Storage conditions" includes all aspects, concerning for instance legal obligations and technical developments related to interim storage of nuclear waste.

4.5 Justifications

In the following part an answer to the research question: "How do policy makers and key actors within the discontinuation process of the interim storage location in Ahaus justify an extension or discontinuation?" will be provided, related to the considered process developments. Since not all actors justified or argument for or against a process development, it may be that concerning one development all actors will be listed whereas to another development only a few will be listed.

4.5.1 Extension of the Permission

4.5.1.1 BI-Ahaus

Regarding an extension of the permission for the storage of nuclear waste in Ahaus, especially concerning the request for an extension to store low and medium radioactive substance, the BI-Ahaus argues against a further permission and justifies this by the following justifications. One of the most important aspect for them against a further extension of the permission and storage of nuclear waste in Ahaus, are security aspects (Bödding, 2018, 2019; Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018, 2019; Seit 20 Jahren Protest am Zwischenlager,

2014). In the documents it was identified that especially the security of the location is a significant aspect for the BI-Ahaus (Bödding, 2018). The BI-Ahaus is convinced that the security of the facility would not be guaranteed, and that the construction of an additional wall would also not change these fact (Bödding, 2018; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). To support their argument, they refer to a legal judgement, concerning an interim storage location in Brunsbüttel, where the permission would have been denied, due to deficits within the investigation and assessment (Bödding, 2018). Related to this the BI-Ahaus compares the construction of the walls at the locations in Brunsbüttel and Ahaus and concludes that the wall thickness would be significantly lower and thus the interim storage facility in Ahaus cannot longer be approved and consequently also not be extended (Bödding, 2018). Moreover, the BI-Ahaus justifies their arguments mainly within a public forum and use additional forums, such as letters to responsible politicians as an additional way to clarify their argumentation (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). It should be added that the justifications regarding the construction of an additional wall will be considered in the following part. Nevertheless, the BI-Ahaus justifies their argumentation against a further extension with the argument that the security, especially against external interventions would not be guaranteed, and justify this position by adding that experts at an public hearing, concerning the request for an extension to store additional nuclear substances in Ahaus, would have been not informed about techniques about developments of drones in Almelo (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019), and therefore they argue that the security could not be considered as on the state of science and technology. Moreover, the BI-Ahaus reasons that the missing overflight ban would represent a significant security risk, which they mention at the public hearing, regarding the extension of the permission and thus this argument can be considered as a justification against an extension of the permission (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). Another reasoning related to security aspects is that the BI-Ahaus mentions that the security of the elements would not be guaranteed if there would be an extension, justifying this by relating to guidelines developed by the nuclear waste management commission, called “ESK” (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019), which address doubts regarding the security of the elements for a longer duration. Especially with relation to the low and medium radioactive elements the BI-Ahaus refers to legal guidelines of the Federal Environment Ministry which defined a safe storage for a duration of 20 years (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). Moreover, the BI-Ahaus refers to the Atomic Energy Act, which limited the permission for

interim storage facilities for 40 years, and thus conclude that a further extension would significantly exceed the current permission (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). To support this argument, they argue that only a period of 40 years would have been scientifically evaluated and therefore an extension of the permission would require at least a check of the nuclear elements (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018).

In relation to this they justify against an extension of the permission that this processes would require specific steps which cannot be taken in Ahaus since these would require a specific location, called „Heiße Zelle“, which construction would be not allowed in Ahaus, due to a contract (Die Ahauser Misere, n.d.). Another vindication against the extension of the permission is an argument based on experiences within the process, since the BI-Ahaus, expects and fears that an extension of one warehouse could be used to extend the permission of the other warehouse (Bödding, 2019) and mention this fears also within a public forum. They justify their fears, by the argument that also previous contracts and commitments were mostly not respected, which would lead to delays within the process (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019) and thus, they worry that Ahaus could became a final disposal, if there would be an extension of the permission (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019; Teine, 2019). They justify this, by arguing that the initial commissioning of the Schacht Konrad, was planned for 2013 and currently there is a delay until 2027, to put this final disposal into operation (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). They argue that the commissioning of Schacht Konrad would not ensure that the nuclear materials could be stored within the disposal, since the capacity of the warehouse would not be sufficient (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). In addition, the BI-Ahaus accuses the applicant of arbitrarily setting the period of approval until 2057 (Teine, 2019) and expresses this in a public discourse, due to the delay in the commissioning of Schacht Konrad.

4.5.1.2 Operator

In contrast to this, the operator of the interim storage location in Ahaus, justifies an extension of the permission to store nuclear substances in Ahaus, mainly based on a legal administrative level. To counteract the expiring permission, considering the problematic concerning a missing final disposal, the operator requested a further permission to store such substances in Ahaus (GNS, 2016). The operator justifies an extension of the permission especially with the following arguments.

Regarding a legal administrative level, the operator justifies the position, by arguing that an extension would continue to be limited and thus it would be guaranteed that the storage location in Ahaus would be only an interim storage location (BGZ, 2018). Furthermore, the operator justifies an extension, since the elements should not be stored in another location, excluded from a final disposal and due to the fact that there is a delay within the commissioning of Schacht Konrad, the elements would have to be stored for a longer duration in Ahaus (Grothues, & Mediengruppe Pressedruck, 2012; Joemann, 2014). Moreover, the operator uses this argumentation also for the high radioactive elements and reasons that the duration to store nuclear elements in Ahaus would depend on the commissioning of a final disposal (Teine, 2016).

Contrary to the BI-Ahaus, which argues that the operator would have arbitrarily chose the limitation until 2057 to store additional nuclear substances (Teine, 2019), the operator argues that the period until 2057 would have been chosen to ensure a legal accepted storage of nuclear waste in the interim storage facility in Ahaus until the latest possible date to bring the elements to the final disposal Schacht Konrad (Teine, 2019). In addition, the operator mentions that already the Bundestag would have made a law, which established to find a location for a final disposal until 2031 (Teine, 2019), and thus there would be a concept to store elements in the future (Teine, 2019). Moreover, the operator states that the Schacht Konrad should be completed by 2027, which would guarantee that, despite an extension, the facility in Ahaus would continue to be an interim storage facility (Teine, 2019) and thus would not become a final disposal. The fact that the commissioning of the Schacht Konrad would be guaranteed is clarified by the operator, by addressing a check by the TÜV [Technical Inspection Association], which would expect a commissioning in the first half of 2027 (Teine, 2019).

4.5.1.3 CDU

Furthermore, the CDU criticizes that it would not be possible to recognize until when the interim storage of nuclear waste will be continued in Ahaus and argue that there would have to be a limitation to store the elements in Ahaus (Bödding, 2017).

4.5.1.4 UWG

In addition, the UWG argues also against a further extension of the permission, which were identified within a public statement in 2011 where they accuse that the municipality would

only consider financial aspects and would be careless if they would accept an extension of the storage of nuclear waste (UWG, 2016). The adjustment in this case, can be considered as mainly based on mistrust. Moreover, the UWG mentioned in 2012 doubts if the duration of the facility in Ahaus would be limited to 2036 and add that there would be a risk to extend storage of nuclear waste (UWG, 2016).

4.5.1.5 Municipality and Council (Ahaus)

Regarding an extension of the permission the arguments of the municipality Ahaus mainly base on legal administrative justifications. For instance, against an extension of the permission to store low and medium radioactive substances the municipality justifies their position by relating to guidelines of the ESK, which would guarantee a safe storage of additional nuclear substance for 20 years (Stadt Ahaus, 2019). Moreover, the municipality mentions that the permission to store elements would be limited, and that an extension until 2057 would be significantly exceed, since the permission for additional nuclear substances would be limited until 2020 and for high radioactive elements until 2036 (Stadt Ahaus, 2019).

They also express this concern in a legal context, at a public hearing where the actors had the opportunity to express their concerns in front of the authority deciding about the permission for an extension to store additional nuclear substances in Ahaus (Stadt Ahaus, 2019).

Furthermore, mistrust can be identified within their argumentation against an extension, since they mention that no evidence could be given that the intended time plans for a commissioning of the final disposal could be met (Stadt Ahaus, 2019). The municipality criticized that although it has been known for many years that a final disposal would be needed, it would have not yet been possible with appropriate measures to implement a concept for a final disposal and therefore there would be doubts about the existing time plans for the interim storage location in Ahaus (Stadt Ahaus, 2019).

They argue against the extension of the permission, since they reason that due to the limited capacity in Schacht Konrad it would not be guaranteed that the elements from Ahaus can be stored in this disposal (Stadt Ahaus, 2019). In addition, the municipality would like to avoid further transports (Bödding, 2018; Stadt Ahaus, 2019) even if they mention that they would be convinced that the elements already storing in Ahaus must remain in this facility until a repository would be available (Bödding, 2018; „Alle Möglichkeiten ausnutzen“, 2016).

4.5.1.6 Federal Government

By having a look on the justifications of the Federal Government concerning a further extension to store nuclear elements in Ahaus one justification was identified within the documents. The answer of the Minister for Environment, Nature Conservation and Nuclear Safety (Svenja Schulze) to a letter was examined in which she mentioned an extension to store nuclear elements within interim storage facilities would be possible and required, until a final disposal would be available (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018).

4.5.2 Wall

4.5.2.1 BI-Ahaus

Moreover, the construction of an additional wall is related to the argumentation of the BI-Ahaus an important aspect, since the wall is related to several of their justifications. For instance, the BI-Ahaus argues that the argument to build an additional wall, to guarantee more security would be only an excuse, since the wall would be a step to extend and solidify the location in Ahaus (Ahauser BI freut sich über Erfolg, 2014). The BI-Ahaus refers to security aspects, especially concerning an extension to store additional substances until 2057 in Ahaus, since they consider the wall as an important factor to guarantee the security of the location (Bödding, 2018; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). Furthermore, the BI-Ahaus is convinced that the security of the location would not be given, since the construction of the walls would be too thin, and criticize the ESK, which would have estimated the security of the location in Ahaus as sufficient, also against attacks with airplanes (Grothues, 2013). In addition, they mention doubts if the facility in Ahaus can guarantee safety if there would be an attack with an airplane and mention that they would be shocked that there is no prohibition to fly above the facility (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). Furthermore, they reason that the facility in Ahaus would be one of the oldest facilities which is not enough equipped (Grothues, 2013).

Moreover, the BI-Ahaus refer to two concepts which would consider the conditions for a safe construction of a wall, relating to security aspects, and reasons that due to the fact that the location in Ahaus would not fulfill any of these conditions, the security of the location could not be given (Die Ahauser Misere, n.d.). They also cite this aspect in their public position paper and add that the interim storage facilities according to the WTI concept would only intended to make external access more difficult and conclude that, despite the necessary

secrecy of the measure, it would be possible to conclude that the interim storage facility in Ahaus would not be secure in the case of an terror attack (Atommüllkonferenz, 2018).

4.5.2.2 Operator

The operator of the interim storage facility in Ahaus justifies the construction of an additional wall with legal administrative justifications. Thus, and in contrast to the BI-Ahaus the operator justifies the construction of the wall, as a legal obligation, which would all interim storage facilities in Germany had to implement (Bödding, 2017). The operator adds that this decision would have been taken by the Federal Government in 2011, in order to guarantee the security of the locations in the case of external interventions, including terror attacks (Deutsche Presse-Agentur, 2012; GNS, 2012). Moreover, the operator makes the backgrounds of this measure available for the public and thus guarantees an open information base (GNS, 2012). In addition, the operator argues against the opinion of some that this measure would be taken to transform the location in a final disposal (Bödding, 2017). As the operator presents, the construction of the additional wall would be justified by the aim of increasing security against terror attacks (Grothues, 2012) and by carrying out a changing security situation in general (Bödding, 2017). In addition, relating to the security aspect, the operator mentions that this measure would not be required in Ahaus, to guarantee the security of the current elements, nevertheless, this measure would warrant security in the future (Teine, 2014).

The operator supports this argument by pointing out in public that further security requests could be relevant for further transports, which would be guaranteed by the construction of an additional wall and kerosene drains (GNS, 2014). Furthermore, the operator mentions that the safety of the interim storage facility in Ahaus would be one of the best secured interim storage locations in Germany, referring to measures an intermediate storage facility must take to ensure safety (GNS, 2015). This point was also mentioned within the request for an extension to store additional nuclear substances until 2057, where the operator refers to § 6 Atomic Energy Act and argues that all required measures, would have been fulfilled, regarding the security of the location against external interventions (BZA & GNS, 2016). The operator also adds that there would not be particular security implications for the interim storage facility in Ahaus due to the combined use, arguing at a legal administrative level that the security would be given, mentioning this also in the request for an extension (BZA & GNS, 2016). Nevertheless, also the operator reasons that the facility in Ahaus would be an old one, but in

contrast to the BI-Ahaus (Grothues, 2013), it was mentioned that the security of the location would be every time on the state of science and technology and thus the security would be guaranteed (Landtag Nordrhein-Westfalen, 2016). Moreover, the operator reasons that the safety of the facility would have to be on state of science and technology in order to obtain a permission (Teine, 2019). Furthermore, the operator justifies that the security would be given, by referring to the results of a review of the ESK, which would certify the safety of the interim storage facility in Ahaus, considering situations as "Earthquakes, floods, heavy rain, fires and plane crashes" (GNS, 2013). Furthermore, with regard to the decision regarding an interim storage location in Brunsbüttel, the operator refers to a statement of the Federal Office for Radiation Protection, called "Bundesamt für Strahlenschutz", and clarifies that the permission would have not been withdrawn due to deficits regarding security conditions, but rather because the authorities would have been limited to explain the measures against external interventions, because of the secrecy aspect (BGZ, 2018).

4.5.3 Garching

4.5.3.1 BI-Ahaus

Regarding the transports from Garching the BI-Ahaus argues against this transport with the following justifications. One of the most important justifications of the BI-Ahaus against the transports is based on a legal administrative justification, since the BI-Ahaus criticizes that the operator in Garching would resist international recommendations from 1978 regarding the enrichment of the elements, and thus produce much more higher enriched radioactive elements than allowed (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018). The BI-Ahaus criticizes this not only within a public forum but further mentions this concerns in front of responsible in politics (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018). They add that not only international recommendations would provide a depletion of the elements, but further an institute for safety and risk science would envisage depletion as urgently needed before the elements can be temporarily stored (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018). Moreover, a significant aspect for the BI-Ahaus against the storage of further elements from Garching is security, since the BI-Ahaus is convinced that the security of the location in Ahaus would not be sufficient in order to store elements from Garching (Die Ahauser Misere, n.d.). They justify this by referring to a report of the Institute for Safety and Risk Sciences on behalf of the national supervisory committee, called "Nationales Begleitgremium", which would limit the physical protection of interim storage facilities to the

storage of radioactive waste, excluding weapons-grade material (Arnold, Friess, Gufler, & Liebert, 2017; Die Ahauser Misere, n.d.). Furthermore, the BI-Ahaus reasons against the transports from Garching that the materials from the castors in Garching would be highly radioactive and according to estimates of some experts, the material from a castor would be sufficient, for the construction of a Hiroshima bomb (Atommüllkonferenz, 2018; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). In addition, the BI-Ahaus argues against the transports with a technical justification, since the elements would require a repository equitable packaging, in order to be stored in Ahaus (Bürgerinitiative trägt ihren Protest bis nach Garching, 2015; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019), which would be forbidden in Ahaus due to contracts and thus this would require transports to other facilities in order to make them suitable for a final disposal (Bürgerinitiative trägt ihren Protest bis nach Garching, 2015; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). The BI-Ahaus reasons that the technical developments in order to make the elements suitable for a final disposal must be developed at the location were the elements were enriched, since these would be responsible and further would have the requirements to do such a technical process (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019).

4.5.3.2 Operator

The operator of the interim storage facility justifies the transports from Garching with a legal administrative background, considering that these transports were planed and requested already in 1995 and thus the interim storage facility in Ahaus would has a responsibility to store the elements (BfE, 2017).

4.5.3.3 UWG

The UWG justify their position against the transports from Garching with a security and responsibility justification. They argue that the elements from Garching need to be defused before a transport, since these are highly radioactive and further, they argue that these processes would be within the responsibility of the operator in Garching (Stadt Ahaus, 2014).

4.5.3.4. CDU:

Moreover, the CDU, justifies their argumentation against the transports from Garching by referring to a resolution against nuclear transports and criticizing that responsible authorities would not have developed solutions to store those elements (Stadt Ahaus, 2014).

4.5.4 Jülich

4.5.4.1 BI-Ahaus

With regard to the transports from Jülich the BI-Ahaus argues against this transport, by referring mainly to technical and practical justifications. One of the main arguments of the BI-Ahaus against the transports from Jülich is that there would be a need of repository of packaging of the elements, before this can be stored in a final disposal (BI: Ahaus ist keine Option für Jülicher Atommüll, 2015; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2015, 2018; Die Ahauser Misere, n.d.). Nevertheless, they argue that this process would not be allowed in Ahaus, since this would require a specific building, called “Heiße Zelle“, which construction in Ahaus would be due to a contract forbidden (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018; Elfering & Mediengruppe Pressedruck, 2017). The BI-Ahaus mentions that also the repair of an element would not be possible in the event of a failure (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2015). Moreover, the BI-Ahaus reasons that consequently further transports would be needed, to a location, which could carry out this process to make the elements suitable for a final disposal (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2015; Die Ahauser Misere, n.d.). To support their argument, they also refer to a statement by Dr. Moormann, who stated within a committee meeting of the state of North Rhine-Westphalia that the elements from Jülich would not be suitable for a final disposal and therefore a conditioning of the elements would be required and the elements in this form would not be included in a final disposal (Landtag Nordrhein-Westfalen, 2016). Dr. Moormann worked as a researcher at the facility in Jülich for 35 years, where he dealt with the safety of the elements in Jülich (Falter, n.d.). Contrary to the opinion of some scientists, and representatives of the economy and politics, he criticized the security of the elements from Jülich (Falter, n.d.). Furthermore, in 2011 he was awarded the Whistleblower Prize 2011 by the Association of German Scientists (VDW) and the IALANA (Falter, n.d.).

Moreover, the BI-Ahaus argues against the storage of the elements in Ahaus, justifying this by § 8 Radiation Protection Act which would provide avoidance of unnecessary risks to people and the environment (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019).

In addition, the BI-Ahaus argues against a storage of these elements in Ahaus, based on a security justification, and argue that the condition of the elements would have not been sufficiently documented (Die Ahauser Misere, n.d.) and therefore there would be a need to

check the elements, which would require further transports (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018).

Furthermore, the BI-Ahaus states in a public discourse that the operators in Jülich would not only want to get rid of the elements, because a storage would be negative for the location but also because of the danger which would emend from these elements (Grothues, 2011). The BI-Ahaus adds that the interim storage facility in Ahaus would only be approved until 2036, and argue that the elements from Jülich would have to be stored for 65 years before this can be stored in a final disposal, which would exceed the approval for the facility in Ahaus (Grothues, 2011) and uses this as an argument against the transports from Jülich.

4.5.4.2 Operator

The operator justifies the transports from Jülich to the facility in Ahaus, in particular with technical and practical arguments. For instance, the operator argues that the transports to Ahaus would be meaningful, since then only one location would have to guarantee the specific personnel to store the elements (Deutsche Presse-Agentur & Grothues, 2012). In relation to this the operator adds that already elements from the same type would store in Ahaus and thus the personnel would have already many experiences with those elements (GNS, 2011; Landtag Nordrhein-Westfalen, 2016). In contrast to the BI-Ahaus, the operator reasons that there would be no need to open the elements in Ahaus and thus no specific building would be needed in Ahaus (Teine, 2019), also mentioning this point within in a public discussion (BGZ, 2019). Moreover, the operator adds, regarding the security aspect that all transports in the past would have been secure and would had no danger for humans or the environment (Landtag Nordrhein-Westfalen, 2016)

In addition, the operator justifies the transports, from a legal administrative level, since the operator mentions that it would be one of the tasks of the facility in Ahaus to store also elements from research reactors and other locations (GNS, 2011; Landtag Nordrhein-Westfalen, 2016).

4.5.4.3 Municipality and Council (Ahaus)

The municipality Ahaus argues against the transports from Jülich and justifies this for instance by the argument that the transports would be unnecessary, if there would be further transports needed to make the elements suitable for a final disposal (Grothues, 2012). Furthermore, the council decided in 2011 to make a resolution against the transports from

Jülich, criticizing that there would have been an insufficient information basic from the operator in Jülich regarding the transports (Grothues, 2012; Stadt Ahaus, 2011). Moreover, in the resolution the aspect is included that the operator in Jülich would be further responsible to make the elements suitable for a final disposal (Stadt Ahaus, 2011). A further argument against the transports is related to a security justification, since the council, considers the security of the citizens in Ahaus as most important and thus would not accept these transports (Stadt Ahaus, 2011). In addition, the council justifies their position against the transports by a practical justification and argue that due to the discussion Ahaus as a location for companies would have suffered (Stadt Ahaus, 2011). Moreover, the council commissioned the administration to take legal action against the storage of the elements from Jülich (Elfering, 2016; Stadt Ahaus, 2016).

4.5.4.4 CDU

Also, the CDU argues against the transports from Jülich to Ahaus, justifying this on a legal administrative level as they mention that the facility in Ahaus would have no obligation to store the elements from Jülich (Teine, 2016). They expected that all options for the elements would have been considered equally, which would have been not fulfilled from their point of view (Teine, 2016). Moreover, the CDU justify against the storage of these elements that the operator would not informed them in the correct way about the fact that the permission was given to store the elements in Ahaus, which would have reduced their trust (CDU-Fraktion, 2016). In addition, the CDU criticizes if a decision regarding this transport, would be reasoned due to image aspect by the facility in Jülich (CDU-Fraktion, 2016).

4.5.4.5 UWG

Moreover, also the UWG argues against the transports from Jülich (Unabhängige Wählergruppe Ahaus [UWG], 2011), justifying that the permission of these elements would expire in a few years and thus there would be a need to bring the elements back in the facility in Jülich to check these (UWG, 2016). In addition, they justify their position by security aspects, since they argue that the transports could be a risk for the security (Stadt Ahaus, 2011).

In particular, they justify, like the BI-Ahaus that repairing and conditioning of the fuel element would be only possible in Jülich and therefore argue against the transports to Ahaus,

as further transports back to Jülich would be required to make the elements suitable for a final disposal (Stadt Ahaus, 2011; UWG, 2011).

4.6 Approaches from Theories in Relation to the Justification Patterns

Moreover, the justification patterns of the actors will be identified, and the actors will be embedded within the multi-level perspective by Geels (2002). Thus, it would be possible to have a look on the interaction of the different levels, within the system. In addition, the frames concerning an extension of the permission to store nuclear waste in Ahaus will be considered. As Rein and Schön (1993) argued, frames need to be considered with the person whom it is related to, since framing can lead to several understandings of "social realities" (p.147). Thus, the frames and justification patterns will be considered related to the person, by whom it was mentioned, and it will be considered which intention the actors have, framing a specific aspect in one or the other way. Moreover, referring to the second pillar, developed by Borrás and Edler (2014), the instruments will be examined, which the actors use in order to strengthen their position and have an influence on the discontinuation in relation to the multi-level perspective. Thus, one can have a look on the discontinuation process in a broader context and see how the process developments and justifications of the actors might influence the process. Furthermore, the third pillar by Borrás and Edler (2014) will be examined in order to consider if the instruments and the justifications obtained "wide social acceptance and support" (p. 35).

Nevertheless, due to the limitations of this bachelor thesis, the influence of the context in which a justification was mentioned cannot be considered. However, it should be added that all documents within the bachelor thesis are also available for the public and thus the main part of the documents is related to a public forum. Nonetheless, within a larger study one should consider these aspects, since the frames of actors can vary due to the context in which these were mentioned.

Consequently, the discontinuation process and interaction of the actors will be related to the approach of transition pathways by Geels and Schot (2007) to sum up, what the current process looks like. Subsequently, the overall process of the nuclear phase-out, related to the topic of interim storage will be examined with the ladder of discontinuation.

4.6.1 BI-Ahaus

Referring to Geels (2002), the citizen initiative against nuclear waste in Ahaus can be examined within the landscape level, since the initiative exerts influence on the regime level,

thereby try to evoke a change of the system. These put pressure on the regime level and try to create "a 'window of opportunity'" (Geels, 2002, p. 1262), which can lead to a change of the current system.

Since the BI-Ahaus is an initiative against nuclear energy and particularly against an extension to store nuclear waste in Ahaus, they frame the extension of the permission in a negative way (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018). Therefore, they consider for instance the security of both the location (Bödding, 2018; Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018; Die Ahauser Misere, n.d.), preventing the elements from external interventions and as well the security of the elements, beyond the permission as a justification against a further extension (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2019). Moreover, they frame the extension of the permission as a legal administrative problem, since there would be contracts, which would forbid a delay, due to laws and guidelines (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018, 2019; Elfering & Mediengruppe Pressedruck, 2017).

Furthermore, a justification pattern was identified within their argumentation. Regarding all process developments they refer to security aspects (Atommüllkonferenz, 2018; Bödding, 2018, 2019; Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018, 2019; Seit 20 Jahren Protest am Zwischenlager, 2014). They frame security for instance as a condition for a further extension, both in form of an extension to store elements as well in form of further transports, which would be not given and thus an extension would not be justified (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2019). Regarding all aspects, they consider different laws and guidelines, in order to justify their position (Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2018, 2019; Elfering & Mediengruppe Pressedruck, 2017). Moreover, with regard to further transports they argue based on technical justifications related to legal administrative arguments that these would be unnecessary since there would be a need to open the elements (BI: Ahaus ist keine Option für Jülicher Atommüll, 2015; Bürgerinitiative „Kein Atommüll in Ahaus e.V.", 2015, 2018, 2019; Bürgerinitiative trägt ihren Protest bis nach Garching, 2015; Die Ahauser Misere, n.d.; „Konzepte sind gescheitert", 2018).

In addition, another important factor is that the BI-Ahaus mentions to all process developments mistrust, due to delays, or promises which would have not been kept, and use this as a justification against further transports or an extension, since the fact that there is no

final disposal available leads their argumentation (Ahauser BI freut sich über Erfolg, 2014; Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2019). Furthermore, they justify their position mainly within a public forum, and thereby make citizens aware of their position.

Nevertheless, it can be identified that the BI-Ahaus justifies their position referring to laws and guidelines for instance from the ESK or Federal Ministries (Stadt Ahaus, 2019), which support their argumentation against the extension of the permission, whereas in relation to arguments developed by the operator for an extension, based on reports and checks of the ESK, the BI-Ahaus questions these (Grothues, 2013).

It should be examined that the BI-Ahaus is a non-legally banded association and thus, in contrast to for instance the operator or the municipality not restricted by any instance, in their argumentation. This can explain why their argumentation is in some way more framed with regard to emotions than the argumentation by an authority.

One can conclude that the BI-Ahaus mainly uses this type of justifications in order to exert pressure on the regime. Furthermore, therefore they use several instruments, which can be examined as instruments in order to put pressure on the regime level in order to change the system. The BI-Ahaus uses for instance protests in order to make citizens aware of the topic and their position (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, n.d.). Furthermore, the BI-Ahaus operates together with other initiatives in order to prevent further transports and make citizens aware of the topic (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018). In addition, and as well included within the documents, they publish position papers, in order to make their position publicly available and thus might have an influence on citizens or institutions such as other parties and municipalities (Atommüllkonferenz, 2018). Furthermore, in 2018 they provided a paper, including an objection against the further extension of the permission in Ahaus to store additional nuclear substances (Bundesverband Bürgerinitiativen Umweltschutz, n.d.).

This can also be examined as an instrument in order to put pressure on the regime level, which would have to change something.

Moreover, the BI-Ahaus provided a position paper, called “Ahauser Erklärung”, where citizens had the opportunity to sign this paper in order to show that they share the same position as the BI-Ahaus against the interim storage facility in Ahaus (Ahauser Erklärung, n.d.). With regard to this paper, they also provided a paper, called “Ahauser Misere” in which

they include a short summary of the process developments in Ahaus, and how they frame these developments, which is also included in the previous part (Die Ahauser Misere, n.d.).

Referring to Borrás and Edler´s (2014) third pillar, the 11 412 signatures, concerning the "Ahauser Erklärung", show in an exemplary way that many people share their opinions and therefore one can consider their position in a way as socially accepted and supported (Ahauser Erklärung, n.d.)

4.6.2 Operator

According to Geels and Schot (2007) the operator as an actor, within the multi-level perspective can be embedded within the regime level, as one actor within a "broader community of social groups" (p. 400). The operator is thus influencing the changing system within the nested hierarchy form the level between the landscape which puts pressure on the regime and further from the niche-level developing novelties (Geels & Schot, 2007). Nevertheless, in this case the discontinuation process of the interim storage facility in Ahaus has to be delayed, due to a missing final disposal (BfE, n.d.) and thus the regime has to react on the pressure from the landscape with additional instruments, since a change is currently not possible.

In contrast to the BI-Ahaus the operator frames the extension to store nuclear waste in Ahaus based on a legal administrative justification and thus do not see a security problem. For the operator the extension of the permission is only connected to a further request for a permission (GNS, 2016). Nevertheless, the operator also refers to security aspects, regarding an extension, but contrary to the opponent frames this in a positive way, since the operator mentions that all required security aspects would be given, and the location would be also currently provided for future security conditions (Teine, 2014).

Moreover, the justification pattern of the operator, regarding all involved process developments mainly bases on justifications concerning legal administrative arguments (BZA & GNS, 2016; Deutsche Presse-Agentur, 2012; GNS, 2012). Similar to the BI-Ahaus the operator considers security aspects, with regard to an extension of the permission. However, contrary to the BI-Ahaus the operator frames security only as a condition which has to be fulfilled in order to extent the interim storage, instead of a problem for a further extension and argues, due to laws and requirements that the security, concerning elements and the location

would be given (BZA & GNS, 2016). Regarding further transports, the operator frames this as one of the tasks of the facility to store additional elements from other locations. Moreover, the operator frames that there would be no need to open the elements from Garching or Jülich and justifies that thus no “Heiße Zelle” would be required (Teine, 2019).

Furthermore, it should be considered that the framing of the operator is influenced by the position, since the operator is responsible to store the elements within a safe location and since it is one of the tasks to guarantee the security of the location and elements, during the storage (BGZ, 2018). Moreover, it was discovered that the operator has an interest that the citizens accept the facility to continue an interim storage in Ahaus. This could explain, why the operator contrary to the BI-Ahaus, argues more based on facts and legal accepted justifications, than on mistrust and questioned security aspects.

Considering the second pillar by Borrás and Edler (2014), one could examine the instruments used by the operator in order to strengthen the position and have an influence on the delayed process. Since, there is a delayed process and no novelty given, which can exchange the current system the operator has to legitimize an extension (GNS, 2016). Therefore, the operator justifies the position, towards an extension by for instance certificates which guarantee the security (BZA & GNS, 2016). Furthermore, the operator provides information for citizens and gives the possibility to visit the location at an additional visitor center in front of the location (BGZ, n.d.). Moreover, the operator offers meetings with the council and thus guarantees that the council is informed about developments, in order to guarantee trust (BGZ, 2018).

Furthermore, the social acceptance, of the position of the operator is represented, by the legal acceptance due to laws and permission regarding the position and tasks of the operator (BfE, 2016).

4.6.3 Municipality and Council (Ahaus)

The municipality and the council in Ahaus can be embedded within the regime level, referring to Geels and Schot (2007), since these both are part of a group governing the system. Nevertheless, with regard to some process developments the council can also be examined as an actor within the landscape level, putting pressure on the regime level for instance by the adoption of a resolution (Stadt Ahaus, 2011).

Focusing on the city of Ahaus, it is much more difficult to consider a justification pattern in their argumentation. Since with regard to an extension of the permission, on the one hand, the municipality is aware of the fact that the elements have to be stored for a longer duration in the facility in Ahaus (Bödding, 2018; „Alle Möglichkeiten ausnutzen“, 2016), but on the other hand, the municipality and especially the council argues against further transports due to the fact that no final disposal is available (Bödding, 2018; Grothues, 2012; Stadt Ahaus, 2019). Moreover, the municipality and the council mention doubts, similar to the BI-Ahaus, regarding the time planning and appeal that responsible ones would have to provide a concept for a final disposal (Stadt Ahaus, 2019). In relation to the transports and limited technical requirements the municipality and council refer to similar arguments as the BI-Ahaus.

Furthermore, regarding the position of the municipality and the council it should be considered that these have a responsibility for the citizens and environment in Ahaus, and thus security is an important aspect for them. Moreover, as a public authority they have a responsibility to present verified facts, otherwise their integrity could be called into question.

In addition, instruments of the council can be examined in order to put pressure on the regime. For instance, the council has adopted a resolution in 2011 (Stadt Ahaus, 2011), and further commissioned the administration to take legal actions against further transports from Jülich and Garching (Elfering, 2016, Stadt Ahaus, 2016). With the unanimous resolution, they not only made a statement, but also made the citizens aware that the council would have a negative attitude towards further transports to the interim storage facility in Ahaus.

With regard to the second pillar by Borrás and Edler (2014) it can be considered that the instruments by the council in form of the resolution are accepted not only by the members of the council, representing the citizens in Ahaus, but also due to the fact that many other communities have also expressed their solidarity with the resolution of the council in Ahaus (WDR, 2019).

4.6.4 Government

According to Geels and Schot (2007) the Federal Government can be embedded within the niche level, as the authority which commissions the development of innovations which can exchange the current sociotechnical system in order to construct a final disposal (BfE, n.d.).

Due to the limited amount of statements concerning the position of the Federal Government, which refer to the justification of the government regarding an extension, only the website and a statement of the Federal Environment Minister were considered, mentioning that due to the limited permission of the facility in Ahaus an extension of the permission would be possible and required, until a transport to a final disposal (Bürgerinitiative „Kein Atommüll in Ahaus e.V.“, 2018).

However, in relation to the position of the actor, one has to consider that the Federal Government frames this as a possible option, since there is no final disposal currently available and they are responsible for the storage of elements until a final storage location is available (BMU, 2017). Furthermore, according to a law, called “Strahlenschutzgesetz [StrlSchG]” the Federal Government has a responsibility for the citizens and security and have to guarantee a safe storage of nuclear waste until a final disposal is available and has to avoid unnecessary transports (Bundesministerium der Justiz und für Verbraucherschutz, 2017).

4.6.5 UWG

Similar to the BI-Ahaus, also the party UWG can be embedded within the landscape level within the multi-level perspective by Geels (2002), having an influence on the regime level. However, the UWG can also be examined as a part of the regime-level. Nevertheless, due to their influence on the discontinuation process, only their influence from the landscape level will be considered. Known as the party against the interim storage location in Ahaus, they frame the extension to store nuclear waste in Ahaus in a negative way (Unabhängige Wählergruppe Ahaus [UWG], 2016). Therefore, similar to the BI-Ahaus, they argue with the justification of mistrust, due to delays within the commissioning of a final disposal (UWG, 2016). Moreover, also the UWG mentions technical aspects against further transports, since the construction of a special location, called “Heiße Zelle”, which would be required for some elements, would be not allowed in Ahaus (UWG, 2011).

In relation to the process developments a justification pattern was identified. Thus, the UWG mainly justifies their position by the mistrust in promises and limitations, due to several delays, especially in the commissioning of a final disposal (UWG, 2016).

Furthermore, the position of the UWG needs to be considered in relation to their framing, since they argue mainly by security aspects (Stadt Ahaus, 2011, 2014; UWG, 2016), which would be not given and further by technical requirements which would not be fulfilled in Ahaus and thus they frame further transports with elements, requiring such a process, as unnecessary (Stadt Ahaus, 2011; UWG, 2011, 2016). Moreover, the party has a responsibility to represent the citizens in the council, especially considering their attitude against the interim storage location (UWG, 2016).

In addition, actions of the UWG can be examined as landscape pressure as their influence within the council against the interim storage location in Ahaus (UWG, 2016), or their requests within the council against further transports (UWG, 2011). Moreover, also the UWG, agreed with a resolution against further transports from Jülich, as all other parties and commissioned the administration to take legal action against those plans (Stadt Ahaus, 2011).

4.6.6 CDU

The CDU, similar to the UWG, can be embedded in both levels, the landscape and regime level (Geels, 2002), but will be considered within this context as an actor from the landscape, pressuring the regime, in order to change something.

Within the documents the CDU argues for a limitation of the interim storage of nuclear waste (Bödding, 2017). Nevertheless, due to the limited number of documents, concerning this actor, it is difficult to identify a justification pattern within the argumentation of the CDU.

However, as already mentioned by Rein and Schön (1993), the position of an actor should be examined. Considering a statement from the UWG in 2011, one could see that there had to have been a change within the behavior of the CDU towards the storage of nuclear waste in Ahaus, since examining the documents, the UWG is impressed that the CDU had approved their request against transports from Jülich (UWG, 2016). Focusing on the position of the CDU within the entire period of temporary storage in Ahaus, one have to examine that there is a change within the behavior, since the decision to store nuclear waste in Ahaus was initially actively supported by the CDU, the considered justifications show that their position had changed, due to a critical behavior towards an extension of the permission (Fasel, 2004).

According to Rein and Schön (1993) such changes within the framing of a topic, can be related to changes within the context. Due to the limited number of documents concerning the

position of the CDU, it is rather difficult, to see which frames lead their position (Rein & Schön, 1993). Nevertheless, one could consider in further research which context lead to a change within the position of the CDU.

Furthermore, as an instrument against an extension in form of transports, the CDU also agreed with a resolution (Stadt Ahaus, 2011) and further commissioned together with the council the city administration in order to take legal actions against further transports to the interim storage location in Ahaus (Stadt Ahaus, 2016).

Referring to the third pillar by Borrás and Edler (2014) the positions of both parties are related to social acceptance due to the fact that these are elected parties, which are represented in the council, and thus there is still a socially acceptance with their position and instruments.

4.6.7 Transition Pathways

Considering the overall interaction of the chosen actors and their relation to the levels within the multi-level perspective the overall process can be considered with the transition pathways developed by Geels and Schot (2007).

Referring to Geels and Schot (2007) and the interaction of the actors within the chosen discontinuation process the process can be related to the "*Transformation path*" (p. 406). Since, as identified within the documents, the actors UWG, CDU and BI-Ahaus can be embedded within the landscape level, putting pressure on the regime level. Moreover, Geels and Schot (2007), further subdivided "pressure groups" (p.406). Referring to Geel and Schot (2007), the UWG, CDU, and BI-Ahaus can be considered as "*Societal pressure groups" (p. 406), which "*can mobilise public opinion and lobby for tougher regulations" (p. 406). Furthermore, Geels and Schot (2007) consider also other pressure groups which might can have an influence on a regime level, such as "*professional scientists* or *engineers" (p. 406) or "firms*, *entrepreneurs* or *activists" (p. 406*), creating *"*viable alternatives" (p. 406) which "may change perceptions of regime insiders and lead to reorientations of (innovation) activities." (p.406). Referring to the selected case, the latter pressure groups were not directly examined within the thesis. Nevertheless, focusing on the discussion regarding the transports of Jülich, Dr. Moormann could be identified as a "*professional scientists"* (p. 406) having an influence within the regime, concerning the elements in Jülich.

Focusing on the "*Transformation path*" (Geels & Schot, 2007, p. 406), the regime level within this case cannot exchange the existing system, due to the fact that no innovation or novelty is currently available to exchange the existing system (BfE, n.d.). According to Geels and Schot (2007) this leads to "reorientations by regime actors" (p. 406).

Focusing on the topic of interim storage of nuclear waste in whole Germany, this "reorientation" (Geels & Schot, p. 406) could be identified by the law, called "Standortauswahlgesetz", which was adopted 2013 in order to guarantee to find a location in Germany for the construction of a final disposal, "using a transparent and science-based procedure" (BMU, 2017).

4.6.8 Ladder of Discontinuation

To consider interim storage of nuclear waste in a broader context, it will be related to the nuclear phase-out in Germany (Die Bundesregierung, n.d.) by referring to the "ladder of discontinuation" by Stegmaier and Kuhlmann (2016). Focusing on the nuclear phase out in Germany, this can be identified as a combination of a "Restriction" and "Phase out". On the one hand, there is a restriction, to build for instance further nuclear power plants and on the other hand a phase-out of the use of nuclear power plants was decided until 2022 (Die Bundesregierung, n.d.). Thus, until that time nuclear power plants will be in operation, even if there is no final disposal currently available, and thus the elements have to be stored in interim storage facilities until a final disposal will be available (Nationales Begleitgremium, n.d.). Referring to the topic of interim storage in Germany, one could see that even if the decision was made, to phase-out of the use of nuclear energy, this discontinuation process includes much more additional discontinuation processes, which have to fulfilled, in order to examine the discontinuation process of nuclear energy in Germany as completed.

5. Conclusion

Concluding, an answer to the following sub-question should be provided: “Which actors have to be considered, focusing on the discontinuation process of the interim storage facility in Ahaus?” and “Which process developments can lead, in the case of the interim storage facility in Ahaus, to a delay in the process of discontinuation?” in order to answer the main research question: “How do policy makers and key actors within the discontinuation process of the interim storage facility in Ahaus justify an extension or discontinuation?”.

Regarding the first sub-questions the following actors were identified as most important, analyzing the justifications of actors, in the framework of this bachelor thesis. The analyzed actors included the municipality Ahaus and the city council, a citizen initiative against nuclear energy in Ahaus, operators of the interim storage facility in Ahaus, including the former operator for nuclear service [GNS], the company for temporary storage [BGZ] and the company for fuel element storage in Ahaus [BZA], the Federal Government in form of the [BGZ] and the local associations of the parties CDU [Christlich Demokratische Union] and UWG [Unabhängige Wähler-Gemeinschaft].

Furthermore, the second sub-question asks for process developments, which should have to be included, analyzing the justifications of actors, concerning their position towards an extension or discontinuation of interim storage of nuclear waste in Ahaus. Following developments were considered in the analysis: the takeover of the interim storage facility in Ahaus by the Federal Government (BMU, 2017), the construction of an additional wall around the interim storage facility (BGZ, n.d.), transports of elements from Jülich and Garching (BGZ, n.d.) as well as the request for an extension of the permission for the storage of additional radioactive substances (BZA & GNS, 2016).

Answering the main question, one must consider that the justifications of the actors differed in relation to similar process developments, due to their position within the system of the changing process. Thus, the argumentation of the actors varied between legal-administrative, security, technical or responsibility justifications, depending on their position towards an extension or discontinuation to store nuclear elements in the interim storage facility in Ahaus. The results showed that actors arguing against an extension and preferring a discontinuation of the interim storage of nuclear waste in Ahaus, justified this mainly based on security

aspects, whereas actors who arguing for an extension, justified this mainly on legal-administrative justifications and guidelines.

5.1 Limitations and Further Research

By having a look on the results, it should be considered that within this bachelor thesis an explorative case study was provided and thus the results are somewhat limited. This study showed how actors interact within a delaying discontinuation process and how they justify their position concerning this process. However, due to limitations of a bachelor thesis, in time and word, not all processes concerning the discontinuation process regarding the interim storage location in Ahaus could be considered. Even so, this study provided a broad overview related to the process and justifications of involved actors, concerning five developments. Further research could examine more process developments and especially involved actors, as citizens and scientist in order to see how these might influence the process. In addition, further research could compare how the justifications of actors differ depending on the forum in which these are mentioned. Thus, one could also focus on the rhetoric of the actors and analyze how their chosen language might have an influence on other actors. Moreover, a larger historical framework could be considered, especially considering how the behavior of actors might had changed towards the interim storage of nuclear waste in Ahaus or in general. In addition, it could be examined, how the justifications and behavior to interim storage of nuclear waste will change, if a final disposal will go into operation and thus there would be an alternative to store nuclear waste (BfE, n.d.).

5.2 Outlook

In addition, the results of this study can be embedded within the overall discussion of the nuclear phase-out in Germany (Die Bundesregierung, n.d.). Due to the fact that there is no final disposal currently available, the interim storage of nuclear waste has to be postponed until a final disposal will be put into operation (BfE, n.d.). Thus, not only the facility in Ahaus is affected by a delay of the discontinuation process to store nuclear waste, but also other facilities.

Moreover, the decision to phase-out of using nuclear energy is related to much more discontinuation processes, such as the discontinuation of 16 interim storage locations in Germany (BfE, n.d.). Therefore, the justifications of actors need to be considered, since there

are several delays within the commission of a final disposal (BGE, n.d.) and initially the permissions for interim storage locations were limited for 40 years (BfE, 2019).

In addition, the storage of nuclear waste, especially of high radioactive elements, is an important topic, since due to the radioactivity the elements have to be stored for several years in order to protect humans and environment against radiation (BMU, 2017). The Federal Government defines the duration "years" as one million years, in which humans and environment should be protected against the radiation (BMU, 2017). This shows that not only a few more generations will be affected by the storage of nuclear waste but that more of thousands of years humans will be involved, directly or indirectly, in the process of storing nuclear waste.

The analysis of the justifications, in relation to the process developments thus provided an overview, how different actors justify within such a process, and showed that framing could influence how reality is seen. Moreover, the case study clarifies how actors might have an influence on a changing process. Furthermore, the results can show the actors within this process and further in additional discontinuation processes it should be considered that framing of a topic could have an influence on other actors and the process and thus justifications need to be considered, when analyzing a discontinuation process.

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I hereby confirm that this thesis on - Discontinuation or Extension - An Explorative Case Study on the Discontinuation of Interim Storage of Nuclear Waste in Ahaus, Germany is solely my own work and that I have used no sources or aids other than the ones stated. All passages in my thesis for which other sources, including electronic media, have been used, be it direct quotes or content references, have been acknowledged as such and the sources cited.

02.07.2019, Celina Borners

(date and signature of student)