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ANAEROBIC DIGESTION'S POLICY  
DOMAIN: THE POWER OF THE FUTURE  
AN INSIGHT INTO THE INFLUENCE OF MULTI-LEVEL GOVERNANCE  
ON THE POLICY DOMAIN OF ANAEROBIC DIGESTION

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## EXECUTIVE SUMMARY

This study began with the environmental issue of waste that derives from modern society. Incorrect waste disposal leads to contamination, enlarging the environmental issues. Therefore, waste disposal needs to be done in a sustainable matter for society to adapt to the environmental issue it causes. The anaerobic digestion (AD) technique is one of the sustainable techniques to dispose category 3 waste.

Despite the success of this technology, and even though the Netherlands and Germany are similar waste societies, the latter is excelling in the use of the AD technology. The research therefore aims to gain insight in what is driving this difference by looking into the policy domain concerning the technology. The policy domain is defined by the policy arrangement approach by means of four dimensions: actors, resources, rules and discourses. The study takes the impact of multi-level governance in consideration in order to identify organizational structures in society and linking those to the dynamics of the policy domain.

Taking these aspects into consideration leads to the following question: *“How does multi-level governance, in terms of the policy arrangement approach, influence the use of the AD technology by studying Germany and the Netherlands on a national and local level?”*

As the research question implies, it concerns a comparative case study. It concerns three cases in total on both national and local level. The first two cases have been selected as they are, according to the literature and experts, ‘best practices’. Germany is studied in terms of its general policy development over the years and is compared to the overall development in the Netherlands (national level). The second case selected is the municipality Ameland, which is studied on a local level. This case is compared to De Wolden, which has been selected based on geographic and demographic criteria to prevent the research from having nuisance due to practical inequalities. By studying the cases on these two levels, it will help to understand the dynamics of the policy domain. The data on each of the cases is collected through semi-structured interviews, literature study and policy documents.

The adaption strategy includes the use of anaerobic digestion, as suggested by the plan of action set by the European committee. AD is a technique used for organic solid waste treatment practice. It degrades and stabilizes the organic input, making fertilizer, while generating biogas useful for heat and energy. It prevents the release of emissions. This research explicitly focuses at the category 3 waste stream, consisting out of food waste. Due to the risk of contamination, the process needs to obey regulation 1069 that prescribes the treatment.

The two countries and two municipalities are thoroughly described in the within-case description. It describes the context by addressing the chronological development of the policy domain over time. Germany has gone through some major changes during the 1990s, resulting in a system operating from an environment friendly point of view. The national government is much concerned with the execution of the waste organization. Waste is managed per sort of waste by means of highly advanced techniques. The Dutch policy domain has mostly been changing over the last couple of years. In contrast to Germany, the

waste management sector is divided into various facets. The local authorities take care of solely household waste as law prescribes. Ameland however, changed in discourse due to the practical problems that were raised and now controls the commercial waste sector, making it an efficient and cost-effective system. De Wolden remains to continue with the old system. Even though little complaints are raised, De Wolden did make some changes overtime because of the national plan of action. Nonetheless, there is insufficient information on how this plan should be implemented. Besides, as De Wolden faced limited problems, the waste management system has not been altered yet.

Thereafter, the research conducts a cross-case analyzes according to the four dimensions of the policy domain. The research revealed that waste management is strongly related to routines. The lack of know-how and insight into the current state of affairs withholds modification in the waste management system. Technology enables them to create insight into the situation. However, only if problems were to be addressed, the council would be incentivized to get actively involved in the matter. Rules nor plans of action will cause the same effect, but do need to be lectured by the national authorities. This will cause a shift in discourse, moving the councils' role from passive to active.

The conclusion explains that multi-level governance has a positive impact on the adaptation of the AD technology. It revealed a structural barrier in the organization of waste management companies. The organization of Dutch waste management companies should alter. If these companies would structure the waste management sector like Germany, it would enable them to optimize the waste process, making it economically feasible and focusing on the appropriate method for its disposal.

Elaborating on the multi-level governance reveals that it should be organized on both vertical and horizontal levels. It illustrates the limited effectiveness of ecological modernization and confirms the need of multi-level governance. The vertical level concerns the communication of national authorities towards the local authorities. This will support them in resources, increase awareness about the regulation, and might lead to a possible shift in discourse. The horizontal multi-level governance concerns multi-level governance in the area, meaning that all actors involved in a certain area should collaborate on a long-term. If councils, waste management- and waste-producing- companies were to work together, it could create a win-win situation for all actors involved. It requires a change in discourse of the municipality in which it takes a more business-like approach.

Besides, local authorities should overlook the complementary role waste management can have in the production of renewable energy, linking the two sectors.. However, this seems to be forgotten, even though the adaptation thereof could be complementary to one another.

The recommendations focus on the improvement of communication concerning the know-how on waste management. The new administrations system is necessary in order to gain more insight into the situation. Besides, waste management should be arranged more efficiently. This could be done by either organizing or guiding the commercial waste sector.



Thereafter, the organizational structures should be transformed from a facet organization into a structure that focuses on the different sorts of waste.

## PRE-FACE

I want to use this opportunity to thank the people that have helped me to write my thesis and to finish my pre-master's degree. Even though, the main aim of this research was to prepare myself for the master thesis, I have been happily engaged in writing and researching the waste management industry from February to August 2017.

First, I would like to thank Johan Nobbe, who helped me to set-up the research and provided me with the information needed, empowering me to do this research. It enabled me to base my research on real-life experience and to define a topic relevant for society. After all, this topic has been a clear real-life case showing the difficulty to overcome structures in society.

I also would like to thank my supervisor, Sietske Veenman, for her great help during the entire process. The discussions and constructive feedback were crucial for improving my process and word of thought. I appreciate the directness of these discussions and sincere opinions given on the matter. This has challenged me to work to the highest potential. And of course, I am grateful for her engagement in the thesis, the motivation I gained thereof and personal approach taken. An additional thanks for her flexibility on the meeting hours, without I would not have delivered the same result.

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Britt Vonk

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## **GLOSSARY AND ABBREVIATIONS**

- AD = Anaerobic Digestion
- CE = Circular Economy
- EM = Ecological Modernization
- MLG = Multi-level governance
- PAA = Policy Arrangement Approach
- RES = Renewable Energy Systems
- WDAs = Waste Disposal Authorities (Germany)
- WtE = Waste to Energy

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## 1. INTRODUCTION

The consuming behavior of the modern society has led to waste problems. This behavior is called consumerism. Consumerism originates from our history and is nowadays rooted in our day-to-day activities. It is a pattern in society requiring high amounts of products. The enormous amount of consumption causes interim lots of waste. The development of technology was able to facilitate in effective production to meet the demand, yet it accelerated into mass production (Knox & Marston, 2012). This mass production thereafter creates enormous amounts of waste requiring a certain type of waste management.

### 1.1. PROBLEM STATEMENT

Waste management has developed over the last 150 years. However, the two ways of waste management, the incinerator and landfills, remain the prominent means of disposal (Hamer, 2003). These ways are rather unsustainable as two different problems occur with these treatments. Firstly, landfills were simply facing over capacity in the late 1980s across Europe (Bangalore, Hochman, & Zilberman, 2016). This already causes a problem due to the lack of capacity. Yet, the problems go beyond these practicalities. In fact, waste landfills lead to direct pollution of soil, waters and air of the direct environment (Lisk, 1991). An alternative is the incinerator. Even though it can generate energy during the process, combusting waste is ineffective and downgrades the potential of waste (European commission, 2017). Besides, stating that combusting waste is a safe and correct way to deal with these landfills is misleading. The combustible process is associated with the release of carcinogenic and toxic compounds (Hamer, 2003). The release of this toxics even worsens when lacking the correct treatment beforehand. Such a treatment is expensive and is therefore often a reason to avoid these forms of waste management. In fact, the contributions of these dioxins emissions are equal to coal-fired energy process (ibid), making neither of the two dominant forms of waste disposals sustainable.

The European commission (2017) acknowledged this problem and stated that “waste management is one of the main areas where further improvements are needed” (p. 2). Therefore, the European Union adopted an European action plan in 2015. This plan addresses the movement towards a sustainable society in forms of a circular economy (CE).

The CE still needs to be very much defined, however one characteristic is very clear: waste as a resource (Jonker, Stegeman, & Faber, 2016). It is an economic system, allowing consumerism to a certain extent. The commission (2017) stated that the CE has the potential to create new jobs and strengthens the growth potential while “aiming at fostering sustainable consumption and production patterns, in line with EU commitments under the 2030 Agenda for Sustainable Development” (p. 2). Part of this CE, as stated in the action plan (European Commission, 2017), are sustainable forms of waste disposal, including Waste to Energy (WtE) methods.

WtE is defined (ibid) as “a broad term that covers much more than waste incineration. It encompasses various waste treatment processes generating energy (e.g. in the form of electricity/or heat or produce a waste-derived fuel), each of which has different

environmental impacts and circular economy potential” (p. 2). The European commission (ibid) considers four WtE technologies:

“– co-incineration of waste in combustion plants (e.g. power plants) and in cement and lime production;  
– waste incineration in dedicated facilities;  
– anaerobic digestion of biodegradable waste;  
– production of waste-derived solid, liquid or gaseous fuels; and  
– other processes including indirect incineration following a pyrolysis or gasification step.” (p. 3)

National governments than reflected these goals and targets of the European action plan into their national plan of action. The responsibility to achieve those goals is with the national parties supervised by the European committee. Specifying on the topic of concern, it means that anaerobic digestion of biodegradable waste should be reflected in the national plan of action of each of the European countries.

Anaerobic digestion (AD) is a technique used for organic solid waste treatment practice. It degrades and stabilizes the organic while forming biogas which can be used for generating heat and energy. The remaining output is fertilizer apt for industrial purposes. Furthermore, it prevents the release of emissions. These reasons make it a sustainable form of waste disposal (Chen, Cheng, & Creamer, 2008) in line with the waste disposal and energy targets set by the European union.

Various cases demonstrated the success of this technology (GMI, 2013; Nobbe, personal communication, March 21, 2017). However, “despite the extensive and widespread knowledge of the advantages of agricultural anaerobic digestion, adoption of the technology has not been uniform across the globe” (Bangalore, et al., 2016, p. 559). This is not necessarily surprisingly as “technological adoption is rarely uniform across countries” (ibid, p. 559). Nevertheless, it does raise the question how come.

The Netherlands is one of the countries that did not meet the targets set by the European commission nor really adapted the AD technology (Bangalore, et al., 2016; European Commission, 2017; Nobbe, personal communication, March 21, 2017). Whereas this was earlier blamed to the malfunction of the AD technology, this is no longer the case. The AD technology is not widely adopted in the Netherlands regardless of the continuous growth of the AD-sector during the last years (Organic Waste Systems NV, 2011). The reason why the Netherlands did not, remains unclear.

What makes it even more thought-provoking, is when seeing that the AD technology did prove its functioning in surrounding countries like Germany (GMI, 2013). In fact, Germany is excelling in the adaptation of AD technology in Europe (Bangalore, et al., 2016). This, while Germany is a similar waste society (ibid) and geographically located near the Netherlands. It raises the questioned why that there is such a notable difference. Exploring this idea further and linking it to the alignment with the goals and targets on waste management and energy agreements, the questions reinforces the question why the

Netherlands is not adopting the AD technology. Researchers Holm-Nielsen, Al Seadi and Oleskowicz-Popiel (2009) answered that question in a rather general way. They suggest that the penetration of this technology would accelerate by overcoming economical resistance and creating market acceptability. They also argue that it would be a matter of creating favorable national, political and economic frame conditions. However, if the use of the AD technology were to be optimally used, it would offer the economical benefits (Nobbe, personal communication, March 21, 2016). This means that it is rather a matter of national and political framework, being the policy domain.

Elaborating that idea further, social scientists (Westerman & Bicudo, 2005) suggest that supporting the use of AD requires better co-operation and more in-depth analysis in order to develop correct management. In other words, it implies another form of (multi-level) governance which still needs to be studied in order to decide on the appropriate form.

## **1.2. SCIENTIFIC RELEVANCE**

Even though former research expects the problem to lay within this policy domain, there has been no research conducted concerning the actual dynamic and the influence thereof on the use of the AD technology. Recent years do show an increased interest in studying the anaerobic digestion (Chen, et al., 2008; Holm-Nielsen, et al., 2009; Khalid, Arshad, Anjum, Mahmood, & Dawson, 2011). However, much of it relates to the technical advantages and that in relation to sustainability. That is not surprisingly as AD technology developed considerably over the past few years.

Studies considering the policy domain mostly look at the economic potential and business model incentivized by either the market force or government implications (Blumenstein, Siegmeier, & Möller, 2016; Bangalore, et al., 2016). It rather researches the potential of AD technology instead of the adaptation of it.

Besides, none of the researches considered the influence of multi-level governance, even though research suggests the lack of governance (Adger & Jordan, 2009). This makes the other researches different at its core.

When considering the policy domain as described throughout this research, a similar Dutch study has been conducted by Van Rooijen and Van Wees (2006). This study investigated the policy domain concerning renewable energy in the Netherlands in general. As AD technology can generate renewable energy, it also concerned this technology. Even so, the research was not capable of making generalization as policy can still differ along the different types of renewable energies. This means that to clearly understand the policy, it requires a more in-depth analysis per type of renewable energy technology, being in this case AD. Another criticism to this research is that the analysis was done on a national level and not yet on a local level as Westerman and Bicudo (2005) suggest. This limits the research in its outcomes as the execution to generate renewable energies is occasionally organized locally (ibid).

Accordingly, prior research did not consider the multi-level governance when studying the policy, nor the policy domain affecting the use of this particular technology. This research will therefore study this matter in order to cover the scientific gap.

### **1.3. SOCIETAL RELEVANCE**

Besides the scientific gap, it is important to understand these policy domains as they are used in contemporary societies having effect on the day-to-day policy practices (Arts & Leroy, 2006). Developments and scientific insights are therefore of importance and can contribute to structural transformations (ibid). These structural transformations can be complementary to reach the targets set by the European Union, even as improving the waste management sector or renewable energy industry.

The scientific insight into the matter will help to understand the dynamics of the policy domain, and thereafter advice on more practice-oriented recommendation. Understanding the dynamics will allow recommendations on the role of actors, the need for resources, the improvement necessary in regulations and the hinder of discourses. Knowing these structures and barriers allows the recommendation to advice on how to change and which choices to make. If doing so, the society is more likely to use the AD technology, which will empower society to move a step towards to a more sustainable society.

The adaptation of this technology is important to adopt to structures of consumerism are unlikely to change over the coming years, making it important to adapt to the society to avoid environmental issues. But even though sustainable technologies are provided, the adaptation thereof is little. Therefore, it is important to see what prevents the use of the technology and what withholds the system to move towards a sustainable society, making this study important for supporting the technology.

### **1.4. RESEARCH OBJECTIVE**

The aim of the research is to gain insight into the effect of multi-level governance on the policy domain concerning anaerobic digestion technology. The research question raised is as follows:

*How does multi-level governance, in terms of the policy arrangement approach, influence the use of the AD technology by studying Germany and the Netherlands on a national and local level?*

To answer this research question, the following sub questions were formulated:

- 1. What is AD technology?*
- 2. Who are the actors involved?*
- 3. What resources are used?*
- 4. Which rules are applicable?*
- 5. What discourses can be seen?*
- 6. How do the dimensions policy domains influence the use of the AD technology?*

## 7. *How does multi-level governance effect the policy domain?*

The research builds up to this answer by the above-mentioned sub questions. The next chapter starts off with explaining those concepts important to understand the environmental issue of waste and the research its standpoint. In addition, it elaborates on the approach of governing and the definition of the policy domain. The concepts will then be applied to this research by means of the operationalization. Chapter 3 explains the method chosen, the case selection process, how the data is collected and interpreted. Thereafter, chapter 4 will answer the first sub question by explaining the AD technology, the regulations applicable and the benefits of the system. Chapter 5 describes the different cases followed by a structured analysis accordingly to the policy arrangement approach in chapter 6. Thereafter, the final chapter will conclude by referring to the multi-level governance.

## 2. THEORETICAL FRAMEWORK

The following chapter elaborates on some of the earlier addressed concepts in the introduction. It will start with a brief explanation on the various concepts important for this study. Thereafter the approaches are explained, followed by the definitions of various concepts. Subsequently, it explains the theory used to shape this study, the standpoint taken and the operationalization derived from the literature study. By doing so, this chapter demarcates the research subject and the assumed relationships of the core concepts necessary to analyze the collected data.

### 2.1. THE PROBLEM OF THE WASTE SOCIETY

The first concept to address is the waste society derived from modernity. A waste society is when waste has become central to people's lives, and linked to economic growth and political regulations (O'Brien, 2008). It is a problem of which its roots are to be found in modernization. The rise of modernity is associated with capitalism and industrialism (Giddens, 2013), due to the technological, economic, societal, political and epistemological changes which have had an impact on the economic, societal, political and also scientific institutions (Arts & Leroy, 2006). This period has been of great influence on our day-to-day activities.

Since the advent of modernity, the development of technology multifold the production of goods. Production increased in terms of capacity and speed. Consequentially, it allowed society to generate a consumption based society (Knox & Marston, 2012) known as consumerism. Consumerism is the act of consumption on a large scale as a result from structural component of socio-economic activity (O'Brien, 2008). The drawback of consumerism, as it is today, is that it creates a waste society.

Waste, like most environmental issues, appeared as an unintended outcome of consumerism. Consuming is obviously not practiced to create waste, but it is the outcome thereof. 'Unintended' addresses the negativity concerning this outcome. After all, the reason for consuming is not the waste that it leaves behind, but the product to consume (ibid). It is a problem caused by the action of individuals, yet adding to the bigger picture. The fundamental issues thereof lays within the structures of modern societies (Arts & Leroy, 2006). The economic system structures individuals to consume. So even though a single action is not necessarily harmful, the structures of society influences numerous individuals, creating the issue all together. The scope of these actions creates enormous amounts of waste which need to be handled in a sustainable manner.

Dealing with the issue, can be addressed in two ways: mitigation or adaptation. Mitigating the problem would in this case means shaping society in such a way that it leaves no waste. Even though this would be a solution to the problem, it is very unlikely to happen due to the structure of society. The structuration theory by Giddens (1984) pays attention to this behavior. As the actions are influenced by the duality of structures, it is a complex system to change. The duality of structure is explained by the interaction of the agent and structure. It is an "ideational mechanism to explain social change and human progress" (Arts

& Leroy, 2006). On the one hand, actions are structured by institutions, while on the other hand the power of the agency provides a certain degree of freedom. It addresses the duality and therewith it aims at explaining the society's complexity. The complex structures result from a long period of time and are internalized by individuals, making it extremely difficult and unlikely to change in the coming years.

Therefore, as the actions cannot simply be changed overnights due its structuration and the cultural habitat of modernization (Giddens, 1984), it is important to adapt to the structures of society. Waste needs to be handled sustainably reducing the scope of the problem or even solving it. Technology is vital to make these improvements. Innovative technology empowered the industry to reduce their environmental footprint already.

However, countries differ in the adaptation of new technologies. Even when these are important to transit towards a sustainable society. The structuration theory implies that the use of AD technology depends on the structures shaped in society. The duality of structure explains the steady solidifying of the policy domain constraining the day-to-day behavior being in this case the use of AD technology( *ibid*). In turn, it also explains the way in which the policy domain is shaped by the people, making it subjected to change. This duality is central in understanding the policy domain defined throughout this study. It indicates the need to focus on the structuration of society and to interpret the information through the lenses of the changes overtime.

## **2.2. TECHNOLOGY AS A SOLUTION**

Whereas some experts (Gould, Pellow, & Schnaiberg, 2004) argue the drawback of modern technology in terms of industrialization, this research considers the role of technology to be crucial for a sustainable society. This role concerns different ideas about the two dimensions of sustainability. The first concerns the outcomes, the other the processes (Adger & Jordan, 2009).

The first dimension, outcome, relates to the overall quality of life which depends on the ecosystem. Relating this to the waste sector, outcome refers to the environmental impact of different forms of disposal. This means that the methods and technologies chosen directly affect the outcome. As the AD technology is a relatively sustainable method for waste treatment, the outcome has a lower environmental impact than its alternatives (Holm-Nielsen, et al., 2009). For that reason, this study assumes that the outcome of the use of AD technology is vital for sustainable enhancements.

The first-dimension also addresses the second dimension of process, meaning the process on how to achieve a sustainable outcome. "The process is just as important as it is the causal relationship between those instruments (AD technology) and outcomes" (Adger & Jordan, 2009, p. 20). As the research questions why this technology is not broadly adapted, it is important to focus on the process.

Scientist vary in their views on how to approach this process and how they perceive the use of technology. Two theories having different point of views are addressed in this paper as they assume idem the positive impact innovation has on sustainability. Both discuss

the two theories on how these processes should take place: Ecological Modernization and Governance.

To begin with ecological modernization (EM). EM can be interpreted in various way (Milanez & Bührs, 2007), but the main idea concerns the interaction of the market force of demand and supply in relation to the developing technology. The actions taken to manage sustainability focus on the process of consumption and production (Mol, 1996). It suggests that market force leads to the development of new sustainable technologies. Once developed, the innovation creates a turning-point in which technological improvements solve the problems that consumption and production creates. The turning-point arises when production decouples from the environmental impact. This means that production may rise while the impact decreases. It derives from the market forces that encourage this progress. New technologies are considered as the tool for society to become sustainable and is therefore considered crucial.

Even though market forces do have an impact on the choices made, it can be argued whether these are effective in the long run (Milanez & Bührs, 2007). Ecological modernization seems to rely on the free-market that shape the current economic system of our society. This means that market demand stimulates the environmental improvements. Linking this to waste management, it can be questioned whether this approach is effective for those sectors dealing with the unintended outcomes. It is an outcome of the structures of today's society and deals with the waste derived from consumption of good. The interest in organizing waste management is rather part of the production than making it economically interesting in itself.

Besides, applying this theory would rather focus on the improving technology and production of waste management. Even though this plays a major role in the development of waste management, it cannot explain the reasoning behind the use of AD technology. Research already revealed the success of the technology (GMI, 2013). In fact, it has proven its success in Germany (ibid; The Umwelt Bundesamt, 2014). This means that, according to EM, the market will adapt to this new technology. However, in practice, it shows that the upcoming technology did not affect the use of AD technology in the Netherlands. In fact, there is a dispersion among the two countries. This means other factors than EM suggest influence the use of the AD technology. The statement of Terlouw (2017) "technology is ahead, yet our thinking falls behind" advocates that the duality of agency is more important than technology. Thus, according to this information, the explanation is most likely not related to the technological improvements nor market force. Instead, it is related to the structure of society.

This line of thought addresses that the technology is a way to handle the consequences of a waste society, but is not resolve the actual problem. It is by no means the ultimate solution to waste management for a sustainable future, instead it is a mean by which we can adapt to the modern behavior and decrease the impact on the environment. As the success of AD adaptation are clear in Germany, which a similar waste society, the assumptions are that there is no technological barrier for implementation. The process to

achieve these successes are not by means of ecological modernization, but by means of governing in terms of managing (Adger & Jordan, 2009).

Exploring this idea further, it is important to identify the type of governance needed to stimulate the use of AD (ibid). As the explanation lays with other structures in society, it indicates the involvement of other actors. When linking this to the research question, it imposes the multi actors at stake and the idea of market guidance. Therefore, a governance theory is taken as a standpoint in this research.

A governance theory places sustainability central, but focusses on the process to achieve it (ibid). It is an interactive and reflexive process capable to deal with difficult choices by means of dialogues and debates (Meadowcroft, Farrell, & Spangenberg, 2005). Biermann (2007, p. 10) argues that governance should be “adaptive to changing circumstances, participatory through involving civil society at all levels, accountable and legitimate as part of new democratic governance beyond the nation state, and at the same time fair for all participants”. When comparing it to the traditional forms of governing, it is a more problem oriented, reflexive and participatory way of governing that concerns all levels in society involving both state and non-state actors (Bache & Flinder, 1989).

### **2.3. MULTI-LEVEL GOVERNANCE**

Multi-level governance (MLG) is a way of governing. The theory argues the central control of implementation and (post-) decision-making (Bache & Flinder, 1989), and rather describes the dispersion thereof on multiple levels. To “internalize externalities, governance must be multi-level” (Hooghe & Marks, 2001, p. 4). It reasons that if governance were to incorporate all issues of society, it needs to be multi-level system.

The different levels concern both the public and private sector. The communication among these two types of actors, in contrast to the state-centric governmental system, takes an interactive and supplementary role. In fact, it refers to a system of continues negotiation between state actors. In addition to the state actors, it also involves increasing complexity of collaboration with and the growing contribution of non-state actors (Hooghe & Marks, 2001). Consequentially, these interactions shape a certain context and structure, affecting the actions taken in society as suggested by the structuration theory.

This research defines multi-level governance by means of three features that distinguishes it from a more traditional form of governance. Firstly, political systems are connective systems that no longer operate individually, but collaborate with the various levels. In other words, the state actors become part of a greater union, instead of working in separate entities. Secondly, decision-making on a supranational level limits the control of national actors. It aims at collective decision-making towards global challenges (Hooghe & Marks, 2001). Thirdly, it concerns the involvement of both institutions and non-state actors in the process of decision-making (Marks, Hooghe, & Black, 1996). In other words, one’s action are no longer limited to the governance implied by official authorities. Instead, it focusses on the bundling and interaction of various actors (Arts & Leroy, 2006).

The coalitions manifests in two forms of dimensions: vertical and horizontal. The vertical dimension refers to the interaction between the upper and lower levels of actors in society, which are supranational, national, regional and local authorities. It is perceived as a less hierarchical structure that exchanges information on various governmental aspects (Hooghe & Marks, 2001). The horizontal dimension involves the agreements and coalitions between the actors within countries, regions or municipalities. It is a mix of state and non-state actors that focus on the execution of a policy. The task-specific governance structures derive mostly from a common problem in society (ibid). Thus, the vertical dimension concerns jurisdictional matter, whereas the horizontal is more policy oriented.

Both dimensions influence the governance system that guide actions, concepts, organizations like the important structures that shape society (Arts & Leroy, 2006). These dimensions are crucial when evaluating multi-level governance and understanding the dynamics that shape society. Studying these dynamics will help give insight on the formation of the outcomes on the use of AD. Multi-level governance is therefore helpful to evaluate the interaction between multiple actors of state, civil society and market. It reveals the dynamics and points at the responsibility that lays with the governance to move towards a sustainable society. The dynamics that influence the use of the AD technology are defined in terms of a policy.

#### **2.4. POLICY ARRANGEMENT APPROACH**

To understand and evaluate the influence of governance in the waste sector, it is important to study the policy domain through the lens of multi-level governance. Governance is defined as a policy shaped by the various structures and agents that develops overtime. “Territorial identity can change, but it usually does so over decades rather than years” (Hooghe & Marks, 2001, p. 15). Studying this requires an institutional analysis that recognizes the dynamics and incorporates the roots of the environmental issue. To evaluate the policy domain, this research makes use of the policy arrangement approach (PAA) (Arts & Leroy, 2006).

This study uses the PAA to execute an institutional analysis. “An institutional analysis is meant to analyze policy practices from a structural perspective, putting the conduct of agencies between brackets. This implies a focus on process of political modernization and on the way these affect the structural properties of policy arrangements” (Arts, Leroy, & van Tatenhove, 2006, p. 35). Policy is thus subjected to change, developed over time and shaped by multiple actors, while recognizing the interrelated dynamics. It is rather obvious to mention that the role of these actors and their responsibilities lead to social practices, but are at the same time influenced by externalities. This requires a broader approach than solely the classical public administrations analysis (Arts & Leroy, 2006). The PAA incorporates the complexity of society via dimensions. It aims to capture the underlying influences of modernization, the duality of structure and the importance of the multi-level governance important to understand the policy domain of waste management.

The underlying influences (modernization, duality of structure and multi-level governance) are addressed in the three underlying concepts of PAA: institutionalization, policy arrangement, political modernization. The first concept, institutionalization, refers to behavioral patterns of people that create structures in our society. The patterns are commonly executed in society, making them unlikely to change. This makes the structures to a certain extent fixed and difficult to change. However, it does not mean it is impossible. Structures can be adjusted or reconstructed if needed as it is a duality of structure. This institutionalization then shapes the policy domain in which one can operate. This links the first concept to the second, the policy arrangement. This concept defines the policy derived from structures as temporary. It addresses the interaction of action within the framework defined by organizational matters, depending on strategical choices made. The last concept, political modernization, refers to the structural processes that change overtime such as individualization and globalization. It addresses the impact of such changes over time and the up rise of environmental problems, while recognizing the context and affecting relation between the state, market and civil society(ibid). Involving these three concepts allows the PAA to comprehend the roots of the issue and complexity of society.

Exploring this idea further, leads to the definition of policy arrangement as used in this research; “the temporary stabilization of the content and organization of a particular policy domain” (Tatenhove, Arts, & Leroy, 2000, p. 54). This definition implies the subjectivity to change and thus the dynamic of a policy domain. Understanding these dynamics requires to study the practices in its context. A context that has been formed and shaped by externalities over a long period of time. The PAA will then help to unveil those aspects necessary to gain insight into the situation and understand the relation between the policy domain and the use of AD technology.

The PAA describes the aspects and dynamics in four dimensions: actors, resources, rules and discourses. These four dimensions cannot be seen separately as they are interwoven into the wider context. In fact, the theory is draws upon earlier theories on networks and has been enriched with the element of the discourse analyzes. Studying the dimensions apart from one another would diminish the quality of the PAA to understand the dynamics (Liefferink, 2006).

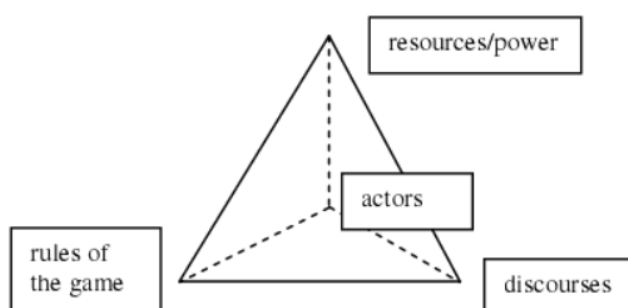


FIGURE 1: TETRAHEDRON (LIEFFERINK, 2006)

The tetrahedron in figure 1 is a visualization of the interrelatedness of the four dimensions. It shows that a change in one of the dimensions may induce a change in another dimension. For example, the advent of a new actor or coalition can lead to new resources, modify rules or bring new elements of a discourse. Similarly, a new discourse, resource or rule can attract or initiate the involvement of new actors. New ideas can instigate other forms of coalitions and rules can alter a situation by formally binding requirements. Therefore, the policy domain needs to be studied in its whole (Lieverink, 2006).

By means of these four dimensions, it considers both strategic and structural factors that shape the policy domain. This is essential to understand decisions made throughout the process. Moreover, only by understanding the complexity of this dynamic process of interaction and relating that to the way it influences the use the AD technique in the market will lead to new insights. The study is therefore steered by these four dimensions.

#### **2.4.1. ACTORS**

This research will analyze the policy arrangement beginning with the dimension of actors. The actors are those involved in decision-making of the policy domain concerning AD technology. Who is involved and the coalitions among them obviously differ per study. Actors might have changed over the years for various reasons as the interaction of various actors is an ongoing process subjected to change. Throughout this process patterns derives creating a certain policy domain. Therefore, the actors depend on both the field and the period.

Actors in the field of waste management most likely represent an organization. These organizations can be state or non-state, and are to be found on horizontal and vertical dimensions of the different levels address by multi-level governance. Actors can therefore be supranational, national, subnational and local authorities. It is important to evaluate on which level state authorities operate (Hooghe & Marks, 2001). These actors are important as the state supervises the waste management organizations. Even though authorities are central, waste handling companies have the executive role. Thereafter, even though it is rather obvious, but such management would not exist without the waste-producing citizens and companies, and thus inevitable.

Identifying the relevant actors and the coalitions at first, is the ingress to study the other dimensions. It helps to gain an overview of the field. Thereby, it allows to focus on the resources, rules and discourses while placing them in context.

#### **2.4.2. RESOURCES**

Actors are either dependent or empowered by resources. Therefore, it is important to relate the resources to the actors involved to understand the dynamic of the two. Gaining insight will help the study to be more practice-oriented and provide the study with clear examples of the dynamics (Lieverink, 2006).

The resources are policy instruments that support the functioning of the policy domain. Support can be either by means of physical or non-tangible resources. The first

concerns the facilities, technology and financial means (taxes, funds, subsidies) required to organize waste management suitable for AD technology. The second, non-tangible resources, refer to organizational barriers such as competencies, knowledge or power relations. Additionally, it also addresses infrastructural limitations restricting certain actions to be taken. It is important to question both type of resources to gain sufficient insight into this dimension.

Next to the interrelatedness across the four dimensions, these resources can depend on one another as well. For example, the competencies of an organization might relate to their financial means. For that reason, it is important to understand the cause and effects for each of the resources to fully understand its dynamic.

### **2.4.3. RULES**

The third dimension, the rules, designs the framework of a policy concerning certain norms. These can be distinguished in two types (Van Rooijen & Van Wees, 2006): formal and informal.

The formal rules address the law and regulation set by authority mandatory to obey. Rules and law set by state authorities are rather fixed. The decision to create these formal regulations is often based on negative experiences in the past. In particular, rules on waste are strictly defined to prevent contamination (European commission, 2017; Hamer, 2003). Therefore, the experience addresses a certain dynamic, even though it is legally binding at a certain moment in time.

The informal rules refer to those based on a voluntary agreement or which concern nonmandatory goals and targets. This type can be a state authority or non-governmental organizations. Calling these voluntary or non-mandatory already addresses the dynamic of the rules. However, this does not mean that they are less effective.

The formal rules are those made legitimate and agreed upon, whereas the informal normal rules rather reflect the dominance in relation. It is important to study the influence of these rules and regulations have on the policy domain. The influence can provide additional information to understand the relations between the actors and the choices they make.

### **2.4.4. DISCOURSES**

The last dimension concerns the discourses. Discourses are defined as ideas and concepts influenced by a set of practices that induce actions. As discourses can only be created by a group of people, meaning that it influences the actions of more than one individual. These patterns relate to physical to social realities thereby encompassing norms, values, policy papers and certain measures taken and are therewith relevant elements in policy making (Dryzek, 1997). In other words, discourses can affect the actions of groups without them noticing. How strongly it affects the behavior depends on the distributive power (Liefferink, 2006).

Discourse are to be found on two levels. It either involves ideas concerning the organizational structure of the state, market and society or an idea concerning the importance of a certain problem (ibid).

This study defines two types of discourses on these two levels. The first discourse argues the importance of sustainability. This standpoint is related to the vision on the importance of waste management and waste sorting. A Dutch state organization (RWS Leefomgeving, 2017) suggested that people disbelieve the positive impact withholding them from waste sorting. The second discourse concerns the belief of who is responsible for waste management. Other than addressing the law, it questions the role of actors and organizational structures. It investigates the rationale to organize waste management in a way or why it has been like that for various years. This related to the ‘unintended outcome’ (Giddens, 1984). It has never to be of any concern to regulate it differently, up to the moment that scientific insights revealed the need for a change perhaps. Questioning these two different standpoints helps to understand decisions made overtime.

Studying the discourses is relevant as it reveals the shifting ideas about governance in time. It shows the perceptions on problems and the influence of scientific insight on environmental issues (Lieverink, 2006).

## 2.5. OPERATIONALIZATION

Policy domain is defined by the PAA by means of the four dimensions. The dimensions of the PAA design the research, guide the interviews and structure the analysis. Figure 2 visualizes the relations assumed in this research.

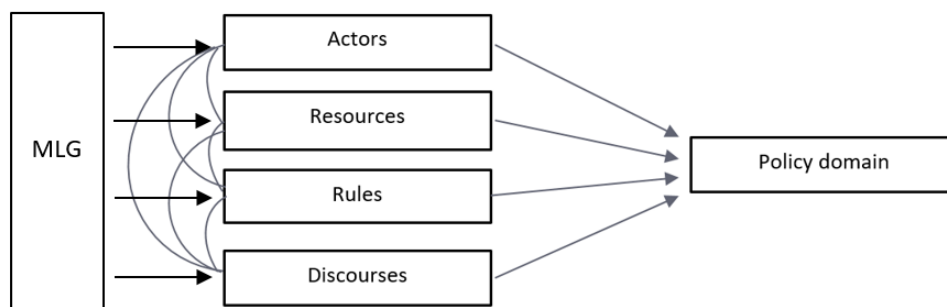


FIGURE 2: CONCEPTUAL MODEL

The conceptual model is placed in a context of a waste society as a result from consumerism derived from modernity. Multi-level governance influences the four dimensions of the PAA. It influences the dynamic of the interrelated dimensions. The connections indicate that the PAA recognizes both social actors and structures that the research aims to point at. These are the underlying thoughts of this research. It is assumed that the policy domain directly affects the use of the AD technology.

Elaborating on these four dimensions by means of literature review and experts in the field, leads to the following operationalization.

Policy Arrangement Approach	Operationalization	Levels
Actors & coalitions	<ul style="list-style-type: none"> <li>- European committee</li> <li>- Ministry of infrastructure and environment</li> <li>- Municipality council</li> </ul>	<i>Supranational</i>  <i>National authority</i>  <i>Subnational or local authority</i>
		<b>Companies addressed</b> <i>department of waste management companies</i>  <i>CITA, Van Gansewinkel, Omrin</i>  <i>Attero</i>  <i>Restaurants, supermarkets, hotels, catering, etc.</i>
Resources	Tangible: <ul style="list-style-type: none"> <li>- Financial (<i>taxes, subsidies, funds, etc.</i>)</li> <li>- Facilities (<i>vehicles, containers, administrative systems</i>)</li> <li>- Technology</li> </ul> Non-tangible: <ul style="list-style-type: none"> <li>- Knowledge (<i>incl. competencies &amp; skills</i>)</li> <li>- Infrastructural</li> </ul>	
Rules	Formal: Laws & regulations <ul style="list-style-type: none"> <li>- Regulation 1069</li> <li>- Contract</li> </ul> Informal: Voluntary agreements, and nonmandatory goals and targets <ul style="list-style-type: none"> <li>- Plan of action for waste management</li> <li>- Energy agreement</li> </ul>	
Discourses	<ul style="list-style-type: none"> <li>- The responsibility to organize waste management</li> <li>- Importance of waste management/sustainability</li> </ul>	

TABLE 1: OPERATIONALIZATION

### **3. METHODOLOGY**

The following chapter concerns the research design and explains methodological choices made that lead to “a logical plan getting from here to there” (Yin, 2003). It clarifies on the method chosen and the approach taken in order to answer the research question. The sections elaborate on the type of case study, case selection, data collection, and analysis.

Before going ahead, it is important to note that the research is partly based on two interviews with an expert in the field. These interviews took place prior to and during the setup of the research. Both interviews took place with Johan Nobbe, the key account manager at ReFood, which is the only company in the Netherlands that works with the AD technology. The information provided during these interviews have been essential to demarcate the research. Furthermore, as some of the required information is not available online, data has been retrieved via these interviews. The information significantly influenced the research design, the underlying philosophy and case selection. His assistance was thereafter backed-up by literature research (chapter 1 and 2). The combination of these two sources has led to the following methodology.

#### **3.1. METHOD**

To gain an in-depth understanding of the influence of the policy domain, this research conducts a comparative multisite case study. Studying a certain case enables the researcher to gain a thorough understanding of the situation. The cases are extensively described within a certain context, giving insight into a real-life case in a setting bounded by time and space (Yin, 2003). Studying a case carefully in its context enables the researcher to understand the real-life cases and extends the knowledge concerning that topic. Subsequently, as the cases are evaluated by means of the same theories, a comparison unveils the relations and dynamics of the policy domain. The selected cases are therefore used as functional cases in a certain time and space that help to gain insight into the topic.

The cases are thoroughly studied to unveil the relations of their current policy domain and the use of AD technology. As the literature explains, a policy domain is developed overtime. This means that, to comprehend relation, a longitudinal study is required. The current policy domain is perceived as a result from the past. Therefore, this research explores the changes and decisions made in the past 15 years, which is essential for a correct understanding and to gain a deep insight into the situation.

##### **3.1.1. CASE SELECTION**

To be able to answer the research question, it is vital, to select appropriate cases for this comparative multisite case study. The cases are compared to gain understanding of the policy dynamics in its domain defined by the PAA. Therefore these cases are called instrumental cases which are useful to focus on a specific case that illustrates a certain situation (Creswell, 2012). This research studies 3 cases designated by two types of case selection: best practices and two criteria.

### **BEST PRACTICES**

The case selection process starts by selecting the best practices. A case is defined as best practice if it makes proper use of the AD technology. This selection is paramount when trying to understand why some areas do use the AD technology, and why others do not. The selection is done in two steps: national and local level.

Firstly, as indicated in the introduction, the European Union defined targets, a plan of action and rules for the European countries to obey. However, there is a discrepancy in the performances of European countries. The literature revealed that Germany is an example of best practice. Therefore, the development of Germany's general development of the policy domain is studied to see if any structural features can be discovered. This case is compared to the Netherlands, a country which shows a weak performance in terms of AD technology. This is interesting as the countries are both defined as similar waste societies and are even geographically closely located. Thus, the first step taken in selecting best practices is demarcating the cases by country (national level): Germany and the Netherlands.

Subsequently, the second step focusses on the executive roles within the Netherlands. As waste management is implemented by municipality's councils, the two cases selected in the Netherlands are on a local level. Once again, the best practice within the Netherlands has been selected. However, literature study did not provide any information on the use of AD technology on a local scale. This is not unusual as waste, is processed, as explained in chapter 4, by companies operating on a national level. It is the organization of waste sorting, enabling the use of the AD technology, that is carried out on a local scale. To identify the municipality in the Netherlands having the best practice, an expert (Nobbe, personal communication, March 21, 2017) was inquired to provide information. Relying on this information, Ameland has been selected as the best practice municipality in the Netherlands.

### **CRITERIA**

Defining the last case in the selection process is based on criteria. The reason for doing so, is that the expert (Nobbe, personal communication, March 21, 2017) suggested that Ameland is currently the only municipality in the Netherlands showing promising results. This means that any other municipality in the Netherlands could serve as an example for not using the AD technology. However, simply selecting any other municipality would result in unreliable comparison and thus affect the outcome of the research negatively. Therefore, to avoid such misinterpretations, the criteria set aim to exclude any external factors that could delude the research from analyzing the actual policy domain. As waste management is partially restricted by geographic and demographic factors, it is vital to minimize the probable impact of these factors. The criterion involves the geographic and demographic externalities, and therewith helps the research to focus on the four dimensions of the policy domain. The criterion concerns two factors: urbanity and the amount waste produced.

The first and by far most important factor is the urbanity degree (Nobbe, personal communication, March 21, 2017; Kuperus, personal communication, May 12, 2017). Organizational waste management structures are constrained by infrastructures. These structures influence waste collecting methods as they differ on the available space and the mobility to transport. Other barriers could arise from incapability to reach a certain place or decreasing the transport efficiency due to long distance travelling. As the study intends to unveil differences in the policy, and not any of these practicalities, the third case selected resembles to Ameland's (non-) urbanity degree.

Even though Ameland is a non-urban area (CBS, 2017), unlike the third case selected, the island is concerned with a significant amount of tourism influencing the amount of waste produced (Kuperus, personal communication, May 12, 2017). So, while the urbanity degree is alike, the amount of waste produced can still differ significantly. As one can imagine, this may influence the decision-making on waste management. Therefore, the second criteria ensure a similar waste production of the two Dutch municipalities.

Ensuing these two criteria lead to the selection of De Wolden. An overview of the required data concerning the selection process is given in the following table.



	Ameland	De Wolden
		
<b>Country</b>	Netherlands	Netherlands
<b>Use of AD</b>	Yes	No
<b>Urbanity</b>	Not urban (5/5) *	Not urban (5/5) *
<b>Amount of waste (KG/per person)</b>	954	706
<b>Amount of organic waste (KG/per person)</b>	250,1	224

TABLE 2: CASE SELECTION

SOURCE: (NOBBE, PERSONAL COMMUNICATION, MARCH 21, 2017; CBS, 2016; CBS, 2017)

\*Both municipalities score five on a scale of five. They are both assigned to the lowest degree of urbanity.

Spatial indifferences are minimized by means of these two criteria, permitting the research to focus on the effects of a policy. It is a municipality similar to Ameland in terms of its geographic and demographic features.

Once selected, the case selection was linked back to the expert and verified to ensure that the appropriate cases were selected for this study (Nobbe, personal communication, March 21, 2017). Subsequent to this case selection, Germany and the Netherlands are

compared in terms of their overall policy development (national level), and Ameland and De Wolden are studied on a local level.

### 3.1.2. DATA COLLECTION

To get understanding of the situation, the three cases are thoroughly researched and information is gathered by interviewing experts and respondents. Policy is often related to official written documents. But, as this paper describes policy by four dimensions, detailed information in line with the theory is essential to analyze accordingly and unveil the dynamics of the policy domain. Policy documents and literature research are used to back up the information and ensure triangulation of the data. This section will firstly explain the type of interviews, followed by the respondents and experts, and at last it elaborates on the triangulation of the information.

To gain in-depth understanding of the three cases, the actors are interviewed according to the four dimensions of the PAA. To maintain that same structure, the interviews with the respondents are semi-structured. While following the structure, questions remain open for surprises. This open mind-set is important to ensure all information's is addressed and avoids 'the expected' answers. To ensure the latter, the word choice has been selected carefully to avoid any judgements or raising suggestive questions. By doing so, the answer is open for unexpected information and therewith enriching the research. Besides, this avoids any biased confirmation of the addressed presumptions, which is particularly important when raising discourses.

What the structure of the interview guide aims at, is to raise similar questions to gather alike information. Otherwise, it is impossible to do a correct comparative study. The interview guide consists out of open-ended question that builds upon these four dimensions. For a more detailed insight into the questions raised, see the appendix.

Additionally, even though the interview guide is developed for all interviews, the questions raised are adjusted every time. This is done for two reasons. Firstly, information collected in earlier interviews is reflected in the following interviews. Questioning this information once again with another respondent ensures the validity of the data. Therewith, it confirms the collection of saturated data. Secondly, the actual questions raised slightly differed depending on the interviewee. This is to conduct the interviews effectively and to raise only appropriate questions. In addition, probing has been used to gain more in-depth knowledge where needed. By means of this interviewing technique, the interviews have been rather a dialogue than simply raising questions. Therefore, the information gathered is complete, saturated, and validated.

The research interviewed both experts and respondents. The respondents are those actors involved in a case, whereas the experts have been able to provide more general knowledge on their experiences and how they perceive the situation. As earlier mentioned, the set-up of this research inquired an expert of ReFood. In addition, another expert has been acquired on a national level (Senior Advisor Biogas). This expert has a wide knowledge on the implementation plan of many municipalities. The information acquired during that

interview confirmed the answers given by the respondents. In addition, the information provides an insight into the perspective of the national government, their desires and experience with implementation plans. Thus, the two experts provided information on the Dutch policy domain and cross-info on Germany. The following table gives an overview of the experts interviewed.

Experts	
AD technology	Johan Nobbe (ReFood)
National level	Matthieu Dumont (Senior advisor Biogas at RVO)

TABLE 3: EXPERTS INTERVIEWED

The respondents interviewed were those involved in the policy making of each case. The actors are, as literature states, the local authorities, waste management companies, and waste-producing companies. Therefore, these type actors have been interviewed for both Dutch cases. However, as it is difficult to know beforehand which persons are involved for each case, the starting point for each of the cases has been the municipalities council. During the first interview, information on the other actors involved has been enquired. This ensures that the appropriate respondents were interviewed. The following table gives an overview of the respondents interviewed. More detailed information on the interviews is placed in the appendix.

Respondents	Ameland	De Wolden
Local authorities	Council – waste coordinator	Council – waste coordinators (2)
Waste management companies	Omrin, ReFood	Van Gansewinkel
Waste-producing companies	Supermarket, cafeteria	Restaurant

TABLE 4: RESPONDENTS INTERVIEWED

Even though the interviews are the most prominent method of data collection in this study, allowing the collection of first-hand information, additional information is retrieved from policy documents. Information given during the interviews, is checked by desk research. Most of this desk research has been on the regulations and action plan relevant to the AD technology treatment of category 3 waste. The interviewees provided cross-information on some of the actors involved that were not interrogated.

Germany's case description is mainly based on online information, which has been confirmed by the respondents and experts. The interviewees provided cross-information on the Germany's situation, enabling validation of the information provided by articles, policy documents and literature research.

The combination of these three methods; literature research, policy documents and interviewing, ensure a triangulation of the data.

### 3.1.3. DATA ANALYSIS

The cases are analyzed on two different dimensions as addressed earlier: national and local. Both countries are evaluated on their overall policy development during the 1990s up till

now. The Dutch policy domain is then mirrored to that of Germany. This gives insight into the fundamentals on which a policy domain is based.

In addition to this overall insight, the Netherlands is analyzed on a local level by studying two municipalities.

The combination of those two dimensions enables understanding the fundamental differences, even as the practice-oriented variances. Figure 3 visualizes this type of analysis.

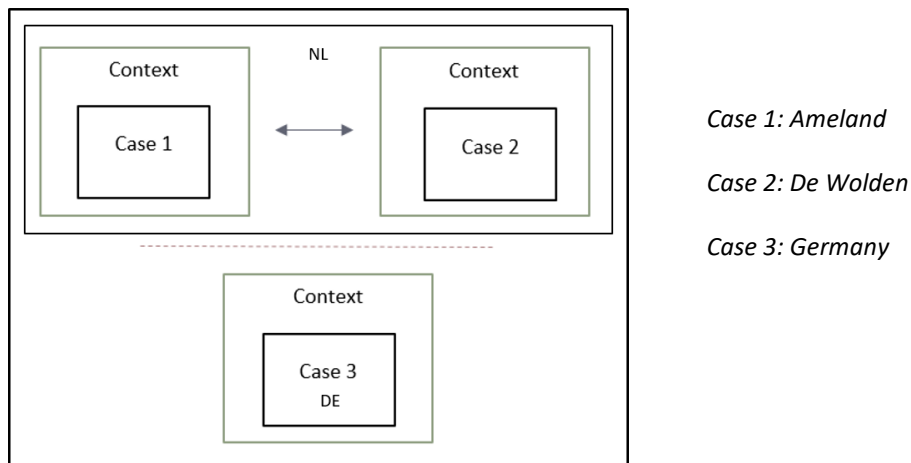


FIGURE 3: VISUAL OF THE APPLIED COMPARATIVE

The structure of the analysis is not based on the two dimensions of analysis. Instead, it consists out of three steps in which the cases are firstly described in the within-case description, followed by a cross-case description and resulting in a conclusion.

Firstly, the three cases are described extensively based on a chronological story of the adjustments and experiences overtime in the within-case description in chapter 5. This description is composed by means of a 'first layer coding'. This coding highlighted the problems, improvement, adjustments and perspectives overtime of the collected data in AtlasTi. By doing so, the within-case description outlines the empirical data by addressing the actors, resources, rules and discourses by means of story-telling. It focusses on the concepts, decision-making process and context in which these cases took place. The chronological structure helps to understand the decisions made and to understand the dynamics of a certain case. This is necessary to interpret the data correctly and pursue with an accurate cross-case analysis.

The second step is the cross-case analysis, comparing the cases according to the four dimensions of the PAA. It has been written according to the 'second layer of coding', coded in AtlasTi, according to the four dimensions. The comparison reveals differences and similarities between the cases. By doing so, it allows to see those elements of the PAA that influence the use of the AD technology, and consequentially answering the research question.



After the cross-case analyzes, the conclusion linked to information to the multi-level governance theory on a more abstract level. It questions the impact multi-level governance can have on the policy of AD technology.

## 4. ANAEROBIC DIGESTION

The problems of unsustainable waste management have led to a European action plan (European Commission, 2017). This plan considers four waste to energy (WtE) systems for waste management companies to use. One of the four systems is anaerobic digestion. National governmental policies developed a national plan of action describing and advising on the implementation of this action plan suitable for their country. This national plan of action defines the aims and targets, but are issued as informal regulation (European commission, 2015a). The aims and targets are an ambition rather than having actual consequences (Europese commissie, 2015b). The latter is elaborated on in the within-case descriptions.

Anaerobic digestion is a technique used for organic solid waste treatment practice. It degrades and stabilizes the organic input by means of microbial organism while forming biogas in the absence of oxygen (Chen, et al., 2008). The process starts with the input of organic waste. Before it goes into the process, the waste needs to be sorted appropriately to avoid any mixtures of residual waste, after which it undergoes a hygienic treatment. The latter is necessary to kill any harmful bacteria or treats. Once done, the left-over goes into the anaerobic digestion process. During this process, biogas arouses which can be used for energy and heat recovery. Both heat and energy can be used for the anaerobic digestion process or can be linked to the energy network (Nobbe, personal communication, March 21, 2017). Eventually, the remaining material is fertilizer, which is used for industrial purposes (Bangalore, et al., 2016; ReFood, 2017). It is a process that also occurs in some natural soils, lakes and oceans (Macgregor & Keeney, 1973; Koyama, 1963).

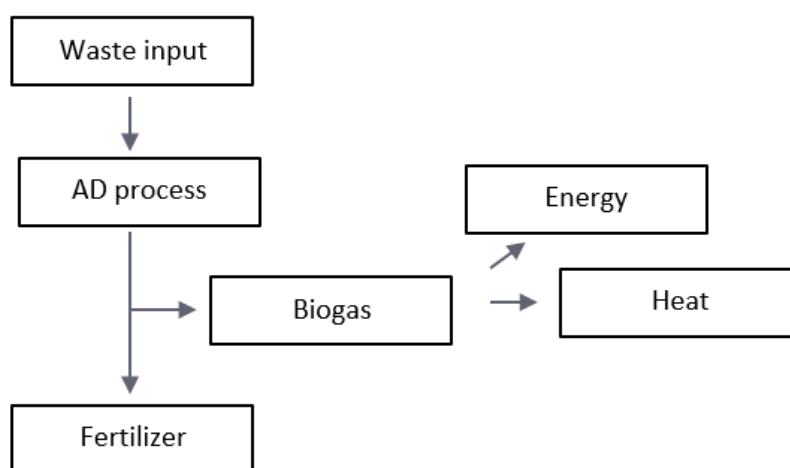


FIGURE 4: ANAEROBIC DIGESTION PROCESS

Whereas Hamer (2003) had argued the failure of the AD processes at that time due to safety reasons, anaerobic digestion seems to be successful nowadays (GMI, 2013). The technology developed significantly over the past couple of years. This decreased the cost of investment and stabilized the quality of the outcome, making it a less risky operation. It also increased the effectiveness of the process (Holm-Nielsen, et al., 2009). Due to the improved quality of

the system, and thus its increased potential, has gained increasing attention among countries (GMI, 2013; Bangalore, et al., 2016).

AD is most advantageous for agriculture and industrial waste due to the high level of organic waste streams these industries create (Holm-Nielsen, et al., 2009). Therefore, it is mandatory for companies producing large waste streams to sort their waste properly (Nobbe, personal communication, March 21, 2017). However, it can also be used for domestic waste purposes if waste is collected appropriately (Khalid, et al., 2011). Once done, both commercial and household waste sectors could be handled.

#### **4.1. WASTE INPUT**

It is not the technique that makes the process difficult. It is rather the risk of bacteria left in the output. Therefore, it is important to collect the correct input for the process. However, handling this input is not without any risk, making it costly for its setup (Nobbe, personal communication, May 9, 2017; Dumont, personal communication, May 24, 2017; Ministerie van Infrastructuur en Milieu, 2014). Incorrect treatment of the waste can result in the contamination of fertilizer, having disastrous consequences as the fertilizer is used for agricultural purposes afterwards.

In fact, history has thought the consequences of incorrect waste disposal. This waste stream was previously used to feed pigs. However, the decay caused diseases ending up in the food system of humans. Besides, it contaminated fields, resulting in additional outbreaks of illnesses and diseases (Nobbe, personal communication, January 22, 2017). This has led to strict regulations on solid waste management.

##### **4.1.1. REGULATION**

The strict regulation on solid waste management suitable for anaerobic digestion have been defined in the regulation 1069 (2014). This is a formal European regulation that prescribes the treatment of solid and organic waste. This is so important as it involves health risks. The regulations therefore prevent contamination of the fertilizer by decay of waste (Regulation (ec) No 1069/2009, 2014).

To elaborate on the latter, it is the most important law regarding the waste input and treatment, prescribing the appropriate treatment for different types of waste categories. It concerns methods for processing, hygiene regulations and the standard format for supporting documents depending on the type of waste. However, each waste stream requires traceability accordingly to the implementing measures. In fact, what the regulation 169 defines is the correct treatment for each of the waste categories (ibid).

Narrowing this regulation down to the relevant waste stream for this research brings us to the section of animal by-products and those derived thereof. It concerns the waste derived from 'not suitable for human-consumption' (Fytoweb, 2015). In contrast to other waste streams, this stream is more likely to rot and contaminate its surroundings, making it more hazardous. This type of waste is classified in three categories, reflecting the degree of risk on public and animal health. The categories of high risk should only be used for purposes

out of the feed chain, whereas lower risk categories are permitted under strict and safe conditions (Regulation (ec) No 1069/2009, 2014).

#### 4.1.2. CATEGORY 3 WASTE

The latter category consists out of (wet) animal by-products and processed food. What is considered to be this type of waste is rather complex. Even though certain waste fits into the category, it still needs to meet some criteria. For example, it is also related to the country of production and its life-cycle. However, to not overcomplicate the situation, this research considers the following type of food waste containing animal by-products are suitable for the AD technology:

- Processed food (referred to as SWILL)
- Used oils and fats
- Unpack food
- Fish and meat residue
- Bread and confectionery products
- Organic residues from food production

(ReFood, 2017)

As it is prohibited for companies producing a large output to aggregate category 3 waste with other streams (Nobbe, personal communication, May 9, 2017). The waste-producing companies producing these large amounts of waste, apart from the agricultural companies, are catering businesses like supermarkets, restaurants, and hotels.

Category 3 waste is currently often confused with organic waste or disposed with residual waste. Whereas organic waste is in some cases composted, this waste stream cannot. It is prohibited and thus a form of incorrect disposal (Commissie Deskundige Meststoffenwet, 2013). Therefore, the aggregation of category 3 waste with organic waste streams is undesired as it can lead to pollution of compost. Category 3 waste is also often disposed as residual waste. However, this way of disposal leads inevitably to combustion, which is contaminating and a loss of valuable waste. Neither of these two methods are therefore correct forms of disposal.

Even though category 3 waste is a lower risk category, it is still a complex mixture of waste. It is considered as one of the most difficult waste streams to process (Nobbe, personal communication, May 9, 2017; Dumont, personal communication, May 24, 2017). However, due to the improved technologies, anaerobic digestion is more suitable for the processing of category 3 waste nowadays and the remaining material can even be used as fertilizer (Commissie Deskundige Meststoffenwet, 2013; Regulation (ec) No 1069/2009, 2014).

The category 3 can be properly processed in various ways of which one is anaerobic digestion. It can be used to produce fertilizer, energy and animal feeders, providing that the safety regulations are adhered (ibid).

## 4.2. SUSTAINABILITY

Anaerobic digestion is one of the many sustainable technologies for waste treatment and is as well one of the various options for waste management of category 3 (Holm-Nielsen, et al., 2009). In fact, it is at this moment one of the few sustainable alternatives for waste treatment of category 3.

As aforementioned, combustion or landfills are neither desired methods to process waste at any time. Both are contaminating and decrease the value of waste. Another method commonly used is a further developed methods of waste combustion. This method detracts energy during the combustion process. Hence, this method is still by means of combusting and burning the originated values of the waste. AD technology on the other hand, co-digests the category 3 waste material after separating the residual waste. Thus, only the residual waste is combusted. The process creates biogas and the remaining material is fertilizer, enabling to make optimum use of the value waste still has (ibid).

The technique offers, beside the two valuable outputs of biogas and fertilizer, more ecological and economic benefits. Using AD can control the release of odors and eliminate emissions. Compared to the alternatives forms of disposal, it uses the gases carbon dioxide and methane for a greater purpose (Bangalore, et al., 2016; Holm-Nielsen, et al., 2009). This gas reduction is part of the integrated waste management system, creating biogas.

Besides, biogas is a source of renewable energy. It can be used as fuel, natural gas, heat or electricity. Supporting the production of biogas can therefore add to the energy goals (Dumont, personal communication, May 24, 2017). In fact, biogas is at this moment the only form of renewable energy that can be stored, whereas wind or solar energy cannot. This means it is a complementary form of renewable energy, vital for succeeding in a 100 percent renewable energy market (ibid). Thus, if the use of AD increases, it can be complementary to the energy agreements.

## 5. WITHIN-CASE DESCRIPTION

The following chapter provides a case description for each of the three cases. It describes the cases chronologically, addressing the entire context of its previous and current situation, possible changes made, barriers and steps taken in the decision-making process. It firstly explains the national development of the policy in the Netherlands (national level), after which it focusses on two municipalities (local level). Then, it describes the overall development of Germany's policy domain (national level). By doing so, this case description is an introduction to chapter 6 in which the cases are analyzed according to the four dimensions of the PAA.

### 5.1. THE NETHERLANDS

The Netherlands was facing landfill over capacities in the late 1980s, forcing the Dutch government to take actions (Bangalore, et al., 2016; Milios, 2013). It eventually became a system based on the 'lansink's ladder', already incorporated in 1994 (Milios, 2013). This 'ladder' describes the waste hierarchy by means of basic principles to follow the lines to avoid waste generation, recovery of materials, generations of energy and only leaving the left overs for landfilling. In 1997, the government decided to centralize the responsibility of waste management, passing the provincial responsibility. However, the enforcement thereof took only place after the Environmental Management Act in 2002. This act stipulates a waste management plan for every 6 years (ibid). "The first National Waste Management Plan set the framework of future waste management in the Netherlands and introduced the control of waste policies under a national perspective" (ibid, p. 4). The framework refers to the plan of action set for waste management. This plan was established in line with the national targets and goals. It has been revised in 2009, in force up to 2015, with a view to 2021. As a result, the landfills decreased from 35% in 1985 to 2.3% in 2010, making the main treatment of residual waste generating energy while combusting (Rijkswaterstaat environment, 2017). Yet, the executive role remained with the local authorities.

The plan of action (LAP) (Ministerie van Infrastructuur en Milieu, 2014) which still relevant today sets out goals for each of the municipalities to achieve by 2020. The objectives includes the reduction of waste generating to a 100kg per inhabitant, to increase waste sorting and to lessen the environmental impact of waste treatment. If needed, the goals can be adjusted to more realistic objectives (Rijksoverheid, 2014). This plan is adressed under a national perspective, but needs to be executed by the local authorities.

To support the local authorities to do so, the government utilizes a mix of measures to enhance the management system. Sereveral financial incentives are used such as increasing the price of landfilling and combustion, expanding the producers' responsibility and stimulating rate differentiation by a 'pay-as-you-throw-scheme' for household waste (Milios, 2013). For example, the government provisioned 1 million euros in 2015 to stimulate the municipalities. The ministry of infrastructure and environment helps with the handling of the budget and the implementation of the plan of action through Rijkswaterstaat (Rijksoverheid, 2014). In addition, there are several pilot projects that aim at reducing the waste which are

supported by the national government by means of finance and know-how. The NVRD is for example a semi-private organization that aims to share knowledge on waste management (Rijksdienst voor ondernemend Nederland, 2017). Municipalities can inquire know-how from these experts or learn from one another via workshops and trainings offered by the government. Another encouragement is the program (VANG) that offers compensation for waste sorting (Rijksoverheid, 2017). Municipalities are able to receive these benefits if they comply with the objectives. These examples show the effort the national government takes to support the waste management system.

Obligations and rules at the provincial level mostly concern the licensing and monitoring of waste treatment facilities (ibid). The provincial authorities are therefore in charge to control the regulation 1069. What they check is that if a company makes use of an AD technology whether it is executed correctly (Nobbe, personal communication, May 9, 2017).

Even though municipalities have the executive role, they are only responsible for the collection of household waste in their own area as law prescribes. The councils are obliged to collect household waste and sort it from door-to-door. Local authority bylaws on the form of disposal for household waste such as the frequency of collection, types of waste sorting (to a certain extent), and which waste management companies is designated (Milios, 2013). This means that the municipality cannot be held responsible for the collection of commercial waste (Kuperus, personal communication, May 12, 2017; Streutker, personal communication, May 1, 2017).

Besides the action taken in waste management, the government enacted in 1996 a demand-based incentive for renewables energy. It provided support to biogas suppliers. This form of supporting, stimulating the market, is central in the policy domain of the Netherlands. Despite the support, biogas suppliers still saw it as uncertain and dependent on changing political preference. The Netherlands changed from supporting to the promotion of supply (FIT) in 2003. The fit promotion has been adjusted in 2006 and 2011, nowadays known as SDE+ (Van Rooijen & Wees, 2006). The promotion has increased the projects on digestion, and is expected to increase even more since the latter change (Bangalore, et al., 2016). This program would apply for AD technology as well.

Interestingly, Dutch farmers actually started to experiment with agricultural AD during these years. However, low energy prices, technological problems, limited economic feasibility and the lack of government support stopped the projects in 1995 (Bangalore, et al., 2016).

The agreements on renewable energy is in part of the main 2020 goals on climate change. It addresses three objectives. Firstly, it wants to reduce emissions with 20 percent less than in 1990. Secondly, 14 percent of the energy comes from renewables. The third aims at decreasing the energy use by 20 percent. The Netherlands was only at 4.5 percent of renewable energies in 2012, meaning that there is still lots of space for improvement (European committee, 2010). These goals are in line with the advantages AD technology can offer.

## 5.2. AMELAND

The following actors are appointed throughout this case description.

Type of actor	Actors
Local authority	Waste coordinator – municipalities council
Waste management companies	Omrin (waste collector)
	ReFood (AD technology expert)
	Twente Milieu (advising role)
	NNRD (competitor)
Waste-producing companies	Supermarket Manje
	Cafetaria 't kruuspunt

TABLE 5: ACTORS AMELAND

Ameland's waste management has gone through some major changes since 2014, changing from a mostly routine based governance to an improved waste management system in which anaerobic digestion is used. The following subparagraphs describe these changes in chronological order.

### 5.2.1. THE PREVIOUS POLICY

Amerland's waste management system had been running for various years being very much routinized. The price was fixed, the schedule of collecting had been the same for years and there was no reason to question why this should change. In fact, the inhabitants were accustomed to the way it was handled, therefore no problems were raised, giving the municipality no motive to look into the organization. To understand the situation, it is important to understand the context and why certain choices have been made.

The municipality of Ameland has been coordinating both household and commercial waste ever since the waste management act. This, in fact, is an exception in comparison to most of the Dutch municipalities (Kuperus, personal communication, May 12, 2017). The majority solely organizes the domestic waste collection as the law prescribes, and leaves a free market for the organization of commercial waste. However, as Ameland is an island, there is a physical barrier for mainland companies to operate on the island, making its rational different for three reasons. Firstly, the geographical location requires the island to run as much independently as possible. For example, if any complications would occur making it impossible to reach mainland, it is important that day-to-day practices can still be continued. Secondly, the organization of waste management also generates employment opportunities for its inhabitants. This is important to protect the island's economy and therewith their well-being. Thirdly, any failure in the collection of waste could negatively influence tourism, while this is their main source of income. Tourism is crucial for their income, more than it is with municipalities on the mainland. A decrease in tourism would, as there are little other industries operating on the island, affect their economy (Kuperus, personal communication, May 12, 2017; Plaza 't kruuspunt, personal communication, May 12, 2017).

Even though the collection of household and commercial waste offers the just mentioned benefits, it is rather difficult due to the administrative obligations. The municipality is obligated to clearly distinct different cash flows. Their financial report must be precise and transparent on their incomes and expenditures on each waste streams. This was rather difficult at that time due to the old administrative system. As municipalities are by law obliged to collect household waste, they need to keep track on all the waste collected. This requires the administration of all the incoming and outgoing waste. This old system tracked the waste by means of paper work. This means that each container of waste needs to be written manually for each step taken. It is rather needless to say that the old system caused confusion due to the pile of paperwork it caused.

Besides, the system calculated the amounts of waste produced per person or container as the system limited their means of calculating. This approach was used to estimate both the amount of commercial and household waste. This method for cost allocation has been causing high costs. Companies were restricted to pay a fixed amount for their waste disposal based on a price per container. This means that there was no differentiation in the waste its size nor size of the company. Instead, it was a fixed amount based on how often the containers were discharged. This means that companies having barely any waste during the winter times, simply because there were no tourists, were still charged for the service. Therefore, companies were paying relatively high prices for a service they did not really need. This was obviously easy money making for the municipality. As a result, there was a skewed relation between the estimated waste collected and the actual amount of waste collected (Hoogland, personal communication, May 29, 2017; Kuperus, personal communication, May 12, 2017). Nonetheless, this skewed relation did not incentivize to change the policy domain. In fact, the municipality was just not aware of the imbalanced prices they were charging. The companies paying these high prices, did not address this discontent, as they were neither aware of the high price they were paying. They were accustomed to the way it was handled by the municipality (Manje, personal communication, May 12, 2017; Plaza 't kruuspunt, personal communication, May 12, 2017). Because there was no indication of dissatisfaction, the municipality had no reason to look into the situation. "It was just arranged like that" (Kuperus, personal communication, May 12, 2017) and enabled them to uphold their passive attitude.

Even though this information addresses the lack of awareness regarding the discontent, it does not reason the routine. When exploring that idea further, the interviews addressed two main reasons, both related to resources.

As the system was mostly done by paper work, making it more difficult to track the waste, it was also difficult to gain insight into the actual situation. Kuperus (personal communication, May 12, 2017) indicated there was no insight into the organization of waste collection basically. The routes and times on which the containers were discarded, had been the same for years and once collected, it was transported to the mainland. From that point on, the waste streams were handed over to Omrin. Even the type of waste sorted were handled over a long time simply because it had been like that before. Thus, although

guidelines concerning waste management were changing, it was never questioned whether the system needed improvement. The change in the rule of games, did not affect the policy domain.

To elaborate on Omrin, it is a waste management company that operates on most of the islands and is active in the northern part of the Netherlands that collects the waste for further distribution. As Omrin collaborates with more islands, and originates from a collaboration between all the 'Friese' municipalities, their service was convenient and suitable. Thereby, Omrin has no profit objective due to its structure. The shareholders of Omrin are the municipalities themselves, enabling the company to focus on the service, unlike the other waste management companies in the Netherlands (Hoogland, personal communication, May 29, 2017).

Besides the more complicated administration system, the boat created a monopoly for the council to pursue their waste management system. In fact, the boat transport discouraged many waste management companies to operate on the island due to the high cost of the transport. The water transport increases the cost significantly in comparison to what it would cost on the mainland. Thereby, the council was already shipping household waste, making it more cost effectively to combine the transport with commercial waste. Therefore, the island decided to transport the waste collectively anyways. The waste was then to be sorted afterwards by means of a separation plant (Kuperus, personal communication, May 12, 2017). This, even though, it was for many years in contrast to the regulation, but the island simply felt that there was no other option. Thus, the rules were of no impact on the policy domain. In fact, the boat discouraged other companies to operate on the island therewith creating a monopoly. Even though the commercial sector is a free-market, this gave companies on the island simply no other option than to stay with the municipality's service. This turned out to be an advantage for the municipality, as there was no need to compete with one another and thus leaving space for shortcomings in service and unnecessary high prices (Manje, personal communication, May 12, 2017; Plaza 't kruuspunt, personal communication, May 12, 2017).

This system continued up to the moment that another waste management company came into play in 2014. This company, the NNRD, was able to compete in price and service. Therefore, they saw a great opportunity to offer their service on Ameland. It was rather easy for them to compete with the municipality's service (Kuperus, personal communication, May 12, 2017).

### **5.2.2. REORGANIZATION**

As the NNRD was offering a better deal, the municipality started to lose customers and thereby losing a substantial amount of income. The change in actors has been the inducement for the municipality to improve and changed the dynamics of the dimensions. "We could have let the companies inquire about prices at other waste management companies, but that would be at the expensive of the island's employment" and the desire

to “do things ourselves” (Kuperus, personal communication, May 12, 2017). Thus, this advent triggered the municipality to improve the existing system.

The municipality dedicated themselves to improve, stating the need for efficiency and better practicalities. It was thought that efficiency would reduce the costs and practicality would improve the service. The expectation was that by doing so it would allow the municipality to regain their customers. Yet, what started with the idea of being a small task in 2014, became an entire process of change (Kuperus, personal communication, May 12, 2017; Hoogland, personal communication, May 29, 2017).

The municipality lacked in the resource of expertise and were aware that they needed to inquire this information. It was clear that the expertise needed to be independent, having no personal interest in the deal. As Omrin has had the executive role for years, asking them was not an option. A similar company waste management company having both the expertise and practical knowledge was inquired. This company knew their services were not up for discussion, but were only employed for their know-how. This enabled them to judge and assess the current system critically. Twente Milieu was the company assigned to evaluate, commentate and consult on their management system (Kuperus, personal communication, May 12, 2017).

The advice appointed the need for the municipality to reduce their costs in order to compete with the NNRD. Therefore, this was one of the first thing the municipality considered. The cost allocation used to be, as it still is in many other municipalities, based on the number of people. However, what happens is that a waste-producing company gets charged based on optimal occupancy. In other words, the companies are asked to compensate for non-existing individuals. Obviously, this causes discontent among the customers once known. This problem of accuracy has been solved by assigning the price based on the actual kilos of waste produced. The introduction of a new resource, an automated administration system, enabled them to keep precise note of the actual amount of waste collected. The new system, called the ‘diamant system’, can track the discarded containers in terms of location and weight. In contrast to the previous system, it shows exactly how much waste has been offered by which type of container. Once taken note, the information is immediately gathered in an online system and processed in a database. The advent of this resource has therefore been important crucial to reduce their cost, and thus had a significant impact on the dynamics of the policy domain (Kuperus, personal communication, May 12, 2017; Hoogland, personal communication, May 29, 2017).

The continues search for improvement helped them to look more in detail into their current waste management system, gradually revealing more and more issues. For example, the hinder from various practical handlings were illuminated. Apparently, customers were facing sanitary problems due to incorrect waste separation. At that point in time, much of the category 3 waste was discarded with the organic (GFT) waste. This was causing unhygienic conditions and overly filled containers being too heavy to handle. It became clear that the mixture of these waste stream was even worsening, requiring the municipality to seek for a solution. In the process of doing so, the municipality got in contact with Omrin.

Even though it was not necessarily a problem for them, they did realize they were carrying a waste category unapt for their processes (Kuperus, personal communication, May 12, 2017; Nobbe, personal communication, May 9, 2017). According to Hoogland (personal communication, May 12, 2017), the waste coordinator of Omrin, the company always strives to seek for the best and most sustainable processing solution. Yet, processing the category 3 waste stream requires an expensive system with the necessary expertise. Because Omrin already scopes with most of the waste streams, there was simply no focus on engaging in the treatment of a niche market. Therefore, this problem needed to be solved differently.

While gaining more in-depth information on this matter, it appeared that ReFood, a waste management company specialized in the anaerobic digestion process of category 3 waste, had already been operating on the island for about a year. It uses the technique as described in chapter 4, making it cost effectively and sustainably. Interestingly, their business model varies from most of waste companies' active in the Netherlands. In fact, whereas most companies focus on offering a complete service (Daneman, personal communication, May 29, 2017), ReFood only processes this waste stream by means of co-digestion. More and more companies on the island were accepting their services, like the supermarket Manje being one of the first (Manje, personal communication, May 12, 2017). However, it took two more years for the municipality to involve them in the waste management on the island.

During this process in which ReFood was trying to convince the municipality of the benefits of their service, ReFood pointed at the obeying of regulation 1069/2009 (Nobbe, personal communication, May 12, 2017). According to this regulation, category 3 waste needs to be collected and treated separately. Hence, the companies that did do so, were not necessarily encouraged by the municipality. In fact, before ReFood operated at the island, there was no compliance with the law, even though it already existed since 2009. The municipality addressed their ignorance towards it. The rules were thus of no influence on the organization of waste management. However, once known, it was the decisive moment for the municipality to change their system (Kuperus, personal communication, May 12, 2017; Nobbe, personal communication, May 12, 2017).

Thereafter, the municipality developed a letter in which the waste-producing companies were informed about the regulation to separate the category 3 waste stream. It was supposed to inform the businesses on the island about the European regulation 1069. Whereas some already complied to this law by cooperating with ReFood and therefore did not need to take any action (Manje, personal communication, May 12, 2017), some others were persuaded to do so (Nobbe, personal communication, May 21, 2017). But it did not reach all waste-producing companies as it also seemed that the letter stayed unnoticed (Plaza 't kruuspunt, personal communication, May 12, 2017). Thus, the letter had only been partially effective.

In addition, the municipality developed together with ReFood a list of potential customers. These customers were those having the most problems and therefore most likely to make use of their services. ReFood would then approach these companies. As a result,

most of companies on the island are now separating the category 3 waste stream through ReFood (Nobbe, personal communication, May 9, 2017; Kuperus, personal communication, May 12, 2017).

### 5.2.3. THE CURRENT SITUATION

Since 2016, Ameland has made significant changes in the way they manage and look at their waste. The municipality invested a considerable amount of money to modify the recycling center, routes, system, trucks and containers. This enabled them to improve their services and recovered their lost customers. During that same time, their attitude towards waste management changed as well. Whereas the municipality stated to be very reluctant to change with a passive attitude, it now claims to have an active role in a “business-like manner” (Kuperus, personal communication, May 12, 2017) as they consider waste-management as an opportunity for their economic well-being.

These changes created a win-win situation according to all the respondents. First, the municipality managed to maintain their income, the employment of the executive staff and their independency. While at the same time, the new organization also reduced the necessary workforce of management positions, reducing their costs in the long run. The new system enabled them to reduce the employers’ necessary to run the system. Besides, the new automated administration system enables them to constantly overview the situation, as the data is directly linked to an online overview. It is a matter of online searching for the information needed, instead of having to input the information manually. It empowers the municipality to anticipate to any occurring problems or possible future changes in regulation more easily. In addition, this knowledge enables them to offer adequate services for the businesses, keeping them also satisfied. The second actor are the waste-producing companies, as they benefit from a cost reduction compared to the old system (Manje, personal communication, May 12, 2017; Plaza ‘t kruuspunt, personal communication, May 12, 2017). In fact, the businesses pay less for the disposal of category 3 waste, than they would pay if it were residual waste (Nobbe, personal communication, May 9, 2017). However, it turns out that most of the businesses are not aware of this benefit. “If they were to pay a bit more attention to it, they would notice that it does not need to be more expensive” (Kuperus, personal communication, May 12, 2017). This, while both interviews pointed out that they and their colleagues would most likely change for financial reasons (Manje, personal communication, May 12, 2017; Plaza ‘t kruuspunt, personal communication, May 12, 2017). Thus, unawareness on the financial situation thus prevents waste-producing companies from changing their waste management.

Besides, the current organization is more in correspondence with that what the law implies (Nobbe, personal communication, May 9, 2017). This improvement also accounts for the businesses that make use of ReFood’s service. Besides, separating this waste stream ensures an improved hygiene which favors the waste management companies, the municipality’s service and the businesses involved (Kuperus, personal communication, May

12, 2017; Nobbe, personal communication, May 9, 2017; Plaza ‘t kruuspunt, personal communication, May 12, 2017).

Despite the improvements in the organization and the benefits mentioned above, there are still companies that do not separate category 3. What the municipality and ReFood suggested to be the reasons, were confirmed by the two companies interviewed. The separation of waste is a handling very much dependent on routines. When questing once perspective on waste sorting, it was answered by “I personally would like that, however, I could tell you straight away that it will not be easy during hectic worktimes” (plaza ‘t kruuspunt, personal communication, May 12, 2017). This was followed by the arguments that the municipality would probably start distributing fines as well, that other municipalities refrained from it and that he is satisfied with the current course of action. This resistance to change was also evident at the supermarket, which took about a year to decide to cooperate with ReFood (Manje, personal communication, May 12, 2017). Therefore, it seems that habits affected their decision making.

### 5.3. DE WOLDEN

The following actors are appointed in the De Wolden’s case description.

Type of actor	Actors
Local authority	Waste coordinator – municipality council (administration)
	Waste coordinator – municipality council (management)
	Waste coordinator – recycling center (executive)
Waste management companies	Van Gansewinkel (waste collector)
	CITA (waste collector)
	Remondus (waste collector)
Waste-producing companies	Restaurant Zuidwoldiger Huuskamer
Monitoring agency	RUD Drenthe

TABLE 6: ACTORS DE WOLDEN

The data revealed the recent changes of the municipality in their waste management system in respond to political developments and their goals and wishes for the future. The description is therefore explained in terms of their changes in recent years and their future wishes.

#### 5.3.1. PREVIOUSLY

De Wolden’s waste management system has changed little over the years. The municipality is in charge of the household waste stream as law prescribes. The collection thereof is outsourced and no resources such as vehicles were purchased. In contrast to Ameland, the council does not take any role in the commercial sector. The decision to do so was taken “a long time ago because of political and economic reasons” (Dolving, personal communication, May 29, 2017). There was no further argument than that it has been like that for years. It addresses the passive attitude towards waste management over the years and the discourse taken in this matter.

The collection of household waste had been outsourced with CITA since the management act in 2002. CITA one of the bigger waste management companies in the Netherlands. They have been assigned to regulate and manage the collection of household waste in De Wolden for various contracts in a row. Consequentially, the organization became a systematic operation based on routines. "It's been like that for many years" (Slagter, personal communication, May 16, 2017).

Another example in which this passive attitude reflects is the recycling center that dates back from 1994. This center has once been constructed for the at that time number of inhabitants. The requirements for collecting waste changed during the time, making it more complicated. Nevertheless, De Wolden did not modify the recycling center. In other words, the rules on waste sorting did not affect the organization of the management system. As a result, the center has been declared outdated according to ministry's requirements in the beginning of 2016 (Rijkswaterstaat Leefomgeving, 2017; Streutker, personal communication, May 16, 2017). This obliges them to reconstruct the center according to the new requirements. If the reconstruction was not compulsory, it is most likely that the center remained the same (Slagter, personal communication, May 16, 2017). Although the recycling center needs to be considered as a separate entity from the collection of household waste and commercial waste, it does indicate deficient attention paid to this sector over the years.

In the course of the contract with CITA, the procedures for waste management had changed in 2009, initiating the waste management plan set and the European regulation 1069. Even though the plan is nonmandatory and the regulation mostly concerns waste handling, it is notable that De Wolden did not take any measures. In fact, the coordinator was unfamiliar with the regulation (Streutker, personal communication, May 16, 2017; Slagter, personal communication, May 16, 2017). This lack of know-how was addressed by the other respondents as well. The municipality does not have the competency to act upon these changes due to the lack of this resource (Dumont, personal communication, May 24, 2017; Dankelman, personal communication, May 29, 2017).

In 2013 the RUD Drenthe came into play to consult the councils of various municipality. This actor is mostly an executive agency that supervises the enforcement in the field of environment and regulation. It was founded after a conference in 2011 order to improve this enforcement and work more efficiently(2012). However, the RUD acquires the necessary knowledge empowering them to consult. They advised De Wolden in the following two years to define the specifications and conditions necessary to implement the regulations (Streutker, personal communication, May 16, 2017). Such specifications and conditions concern the all the practicalities involved in waste management, like the waste sorting, systems and schedules.

Even though these recommendations were not put in to practice yet, it was the inducement to change their waste management system. Particularly, the new rule initiated in 2015 on how to handle plastic, metals and beverage package incentivized the municipality to change. But the current contract with CITA restricted them to do so. The contract consisted of an implementation plan which legally retained them to break new ground.

Therefore, the municipality had no other option than to wait until the contract terminated (Streutker, personal communication, May 16, 2017).

Therefore, once the contract ended in the same year, the municipality decided to enquire other options by placing a request on the public tender. This would enable them to make some radical changes, as a contract cannot be extended by law if it differs too much from the previous one. In order to do so, the council developed a proposal in which the recommendations of the RUD were integrated (Streutker, personal communication, May 16, 2017). That proposal contained De Wolden's altered specifications and conditions concerning their preferences and requirements. It defined the collecting methods, desired waste streams and specifies the waste processors. This empowers the municipality to structure the waste management system and the processing of waste according to national standards. Once that proposal is finished, the council can set it out for enquiry on a public tender. Thus, the council establishes a plan that complies with the law and waste management plan that is indirectly communicated to the waste management companies. In the end, the municipality is the one responsible for the execution of those rules (Dankelman, personal communication, May 29, 2017). So even though there was no rush in altering the system, it does illustrate the effects rules and political changes have had eventually.

Thereafter, if a waste collecting company believes to be suitable for the offer, meeting all the requirements set in the proposal, they can enroll by submitting their own policy proposal in response to this public tender. Their policy should specify their offer in terms of quality, price and social return. This means that various waste management companies can administer, creating some sort of competition. Because of this competition, the price offers have dropped considerably according to Van Gansewinkel (Dankelman, personal communication, May 29, 2017). For example, Remondus offered their services to another municipality for half the price, in which they were designated. It is unclear to Van Gansewinkel how they manage these low prices, but it makes their operations more uncertain nowadays (ibid). This indicates the increasing competition in the household sector due to the system of public tender used by the councils to elect the waste management companies.

The uncertainty that comes along with this system, withholds Van Gansewinkel from making any investment until the deal is official. As the vehicles and containers operate with one and the same system, a new purchase requires everything to be replaced. One vehicle costs around 250.000, making the entire replacement very costly (Dankelman, personal communication, May 29, 2017).

To cope with the competition, Van Gansewinkel detached the commercial sector from the household sector in 2014 already. Up to that moment, the organization of the various areas were separate entities. This way of organizing limited them to improve the service of the household sector. Dividing the two enabled them to focus and to offer a superior service to the municipalities than before. Besides, the demand for these services are mostly based on separate contracts with different actors. As a result, the two operate as two different

entities focusing on the different markets (Dankelman, personal communication, May 29, 20017). It was of no need to keep their services joint.

The new proposal on the public tender placed by De Wolden in 2015, led to two option: CITA or Van Gansewinkel. The council assessed them in terms of the price, quality and social return (Streutker, personal communication, May 16, 2017). However, according to Van Gansewinkel, those decisions are more concerned about the price than quality (Dankelman, personal communication, May 29, 2017). Although price is an important factor, a municipality does benefit from a well-organized system. Therefore, switching the waste management company is unfavorable too as it most likely involves changes. These consequentially causes unrest among the inhabitants which has to do with organizational changes in time schedules, routes, vehicles or containers (ibid). In other words, a municipality is unlikely to change their provider if it were not for a reason to do a new inquiry. As De Wolden wanted to make some radical changes, they decided to place a new enquiry even though it can cause unrest among its inhabitants.

### **5.3.2. CURRENTLY**

In response to the request placed on the public tender, the municipality appointed Van Gansewinkel. The decision was mostly based on the price quality ratio of the offer mentioned earlier. The contract was signed with a validity of 4,5 years, making it last until 2019 (Streutker, personal communication, May 16, 2017).

The delegation of Van Gansewinkel lead to adjustments in routes, schedules, payment, vehicles and containers, causing agitation among citizens. It normally takes about a year until it is properly regulated. As waste management is routine based, there is a reluctance to change, in which De Wolden is no exception. For example, De Wolden changed the payment system from a 'pay per person system' to 'pay per emptying'. This similar adjustment was made in another municipality which caused "many citizens to call during the first half year, saying that it is ridiculous" (Dankelman, personal communication, May 29, 20017). This confirms the idea that waste management is strongly related to ones' habits and routines.

Once the waste management is settled after one year, there is little contact between Van Gansewinkel and the municipality. If no complaints nor problems occur, Van Gansewinkel continues their operations as agreed upon. "No contact is good contact" (Dankelman, personal communication, May 29, 2017). This means that the system gets routinized again after a while, and that the collector just gathers what is offered (ibid). The downside of the routinized operations is that it causes limited insight in the material collected and its output. Even though the municipality deliberately chose their waste management companies, there is still a lack of knowledge concerning the current state of affairs. The current administration is still operated with the old system, meaning that the tracking of waste is still handled by manually. This makes the tracking of waste streams rather complicated, making it difficult to anticipate on any issues. In fact, the municipality is only informed of problems when a container gets rejected by a waste processing company. If so, the municipality is charged a fine. However, the council is in most cases not acquainted

for any smaller events (Dankelman, personal communication, May 29, 2017). The lack of control also allows the mixing of household and commercial waste. The municipality cannot monitor whether waste is commercial or household waste (Streutker, personal communication, May 16, 2017; Slagter, personal communication, May 16, 2017). The national authorities are trying to resolve this problem by advancing the administration system (Dankelman, personal communication, May 29, 2017).

Interestingly, the municipality founded a collaboration on an administrative level together with the municipality of Hoogeveen on January first 2015 to strengthen their capabilities. This partnership was to improve their capability in terms of advice and support to execute municipal tasks. By doing so, the councils could advance their services for the inhabitants, reduce costs and increase efficiency. However, this coalition did not concern waste management (Raad en college, 2017; Dolving, personal communication, May 29, 2017).

Despite the collaboration, both municipalities have their own ways of collecting household waste. Whereas Hoogeveen has organized it collectively with two other municipalities, De Wolden has outsourced it to Van Gansewinkel (Dolving, personal communication, May 29, 2017). Although their collecting systems are distinct, Van Gansewinkel does bring part of De Wolden's waste to AREA (Streutker, personal communication, May 16, 2017) and processes AREA's garden waste (Slagter, personal communication, May 16, 2017). This recent development shows that it collaboration in the waste management system are effective.

Later that year in April, a group representatives of the citizen, called "klankbordgroep", was initiated in respond to the agitation earlier that year (Dolving, 2017). These representatives have been selected by the council to ensure an unbiased and representative variation of citizens. The purpose of the group was to involve the citizens and enabling them to make any suggestion, discuss issues and to advice on implementations (Streutker, personal communication, May 16, 2017). However, it seems that Van Gansewinkel faces the drawback of this group as it seems to slow down the decision-making process (Dankelman, personal communication, May 29, 2017). The efficiency of this actor involved can therefore be questioned.

The difficulty that arises from this group is due to the lack of knowledge. For example, the locals believe that the reducing the number of pick-up times will lead to a deficit in containers. And they argue the need for an extra container, if the containers are not emptied that often. However, Van Gansewinkel experienced a decrease in waste production and an increase in waste separation instead. People become more aware of the waste they produce, once it becomes clear that they need to skimp to manage their waste. Thus, reduction increases the awareness among citizens, changing their buying, separating and disposal habits (Dankelman, personal communication, May 29, 2017). Therefore, this belief hinders modifications.

The coordinator does not foresee any other barriers than reluctance to change, in terms of physical resources to modify the waste management system. As the waste

management companies facilitate the organization of waste management in terms of vehicles and containers, the municipality only needs to 'pay the price'. The policy agreed upon specifies these purchases done by the waste management companies and are in correspondence with the price. In other words, the required resources depend on the financial capabilities of a municipality. To support and motivate them, the national government introduced VANG. This is a program in line with the targets to reduce waste, with the intention of encouraging waste sorting. According to the coordinator there are no financial constraints to improve waste sorting due to these subsidies (Streutker, personal communication, May 16, 2017).

While the municipality modified the household waste system for political reasons, the way in which commercial waste was managed in De Wolden remained the same. The municipality considers the businesses accountable to manage their own waste. "Businesses make a profit out of the products they produce, and waste is a price that needs to be paid as part of the profit" (Streutker, personal communication, May 16, 2017). Consequentially, companies can decide upon their own waste management. Most of the businesses in De Wolden have most likely one container of residual waste (ibid) as it is the easiest option. A restaurant located in De Wolden confirmed this. The owner stated that his choice is based on the price offer of the waste management company which is revised every year. The various companies have mutual contact regarding these prices (Bartelds, personal communication, May 16, 2017). Waste-producing companies therefore seem to choose based on economic reasons.

According to Bartelds (personal communication, May 16, 2017) there have been no changes in the commercial waste sector other than switching the provider. So even though regulations have changed, it did not affect the policy domain and making changes in the waste management system. In fact, the coordinator states that they are unfamiliar with the current state of affairs. When probing for further information, it turned out that the city hall makes use of Van Gansewinkel's commercial sector (Streutker, personal communication, May 16, 2017). So even though Van Gansewinkel divided the two sectors, both entities of commercial and household waste are active in the area, yet managed separately.

Furthermore, it turned out that the presumption of the municipality (Streutker & Slagter, personal communication, May 16, 2017) concerning a blend of commercial waste with household waste is accurate. As the owner's apartment is located above the restaurant, the owner explains that company regularly separates waste in the private bins. Even though he would like to separate the waste, he is currently "prohibited by law to do so" (Bartelds, personal communication, May 16, 2017). "It has been like that over the past 10 years" (ibid). This causes overlap of the financial cash flows of commercial and household waste, which is forbidden by law (Kuperus, personal communication, May 12, 2017).

### **5.3.3. FUTURE IMPROVEMENTS**

Even though a municipality faces detrimental effects of a switch in waste management company collector, De Wolden reconsiders to place once again a request once the contract

with Van Gansewinkel ends in 2019. “So many changes took place over the last couple year: the frequency of pick-ups and waste sorting... the entire waste management is changing” (Streutker, personal communication, May 16, 2017). These changes and the need for further improvement triggers the council to reconsider a new policy on the public tender in the future.

Van Gansewinkel believes that one of the burdens incentivizing them to do so, is the current use of old vehicles. However, De Wolden took a long time to sign the actual contract which withheld Van Gansewinkel to invest in new trucks. The drawback of driving old vehicles is that the waste processing companies charge a fee for doing so. This fee is to be paid by the municipality. The structure is supposed to encourage waste management companies to purchase new vehicles. However, it takes a share in the uncertainty of Van Gansewinkel’s operation, suppressing possible other investments (Dankelman, personal communication, May 29, 2017). The somewhat outdated resources are therefore a burden.

The desired improvements relate to the incentives to reach the national target on waste reduction and to meet the needs of the locals, as explained in chapter 5.1. The latter mostly concerns the advancement of routes. In order to reach the targets, the current residual waste per person (175 kg) needs to be reduced to a 100 kg. The coordinator believes that this will require more frequent contact with the collectors to analyze waste sorting. In fact, “there is lots to gain in optimizing the waste management system in general” (Streutker, personal communication, May 16, 2017). In other words, the coordinator addresses the need of improved communication among various levels.

Moreover, both the coordinator and restaurant owner mention that correct waste management is important for the future and are therefore willing to change (Streutker, personal communication, May 16, 2017). Bartelds (personal communication, May 16, 2017) elaborates on that statement by explaining that “if it becomes cheaper, it becomes more interesting”. He argues that a win-win situation could be created if the municipality could earn from commercial waste. However, he also addresses the discourse of “commercial waste and household waste being different and need to be paid separately, making it impossible to combine” (ibid). Thus, the waste-producing companies are simply not concerned with the type of waste management companies as long as the price remains low, they just believe that it is impossible for the municipality to do so.

While the local authorities are seeing the benefits and possibilities of a new request in the future, Van Gansewinkel’s operations remain uncertain. “We are now awaiting of what will happen” (Dankelman, personal communication, May 29, 2017). He also indicates that if the policy will request any changes, they will need to adjust. This describes the relation of the two actors in which the municipality is the directive.

#### **5.4. GERMANY**

Germany is often referred to as one of the countries that has a well-organized management system. In fact, experts (Bangalore, et al., 2016; Nellesa, Grünes, & Morscheck, 2016) claim that it has one of the better systems in Europe. Even though the system is similar to that of

the Netherlands, this chapter aims at elaborating and unveiling those different policy domains that have developed over a long period of time. This chapter describes these overall changes and will therewith enable the comparison with the overall policy domain of the Netherlands.

Even though the waste collection and disposal seem to be self-evident by now, it is a result from a long development of waste management, technology and regulations. Germany has gone through major changes since the 19<sup>th</sup> century (Buclet & Godard, 2013), whereas the Netherlands has never changed drastically. These changes of the German system are explained by means of two phases. The first focuses on the organizational aspects, whereas the second focuses on waste processing techniques.

#### **5.4.1. THE ORGANIZATION**

Starting in the 1960s, the cause and effects of the contamination by waste became evident (The Umwelt Bundesamt, 2014). The amount of municipal waste had doubled from the 1950s to 1961, while there were little improvements made on the side of disposal. Landfilling was still the main method of disposal. As a result, Germany was facing difficulties in their waste disposal leading to hazards by unauthorized dumps. These dumps were put to hold by means of federal action. Even though the citizens had the right of self-determination, regulations were made to obviate many of the diseases cause by this contamination. Therefore, municipalities had to obey minimum requirements focusing on the sanitary aspect to protect human health. Regions slowly started to adopt these regulations and appropriate measures were taken by the actors at municipal and regional level (Buclet & Godard, 2013; Umwelt Bundesamt, 2014).

During the same time, the environmental issues were already put on to the political agenda by the social democrats in 1961, after which it had much influence on the environmental discussion that followed. The elections had therefore a significant impact on crucial changes in waste management (Buclet & Godard, 2013). The problems in waste disposal were recognized by the parties and agreed upon their willingness to co-operate and form a central organization to work out directives and general principles.

By 1965, the central office for waste disposal was established under the authorization of the Federal Health Agency to consult municipalities regarding scientific and waste organizational matters. This actor is in charge of informing the municipalities on scientific knowledge and organizational matters. As the waste treatment was initially imposed by local ordinances, one of the central office of waste advices was to organize the waste management on a larger scale (Buclet & Godard, 2013).

The central office was operational and the costs of this central office were to be shared by both the local and regional governments. Despite this, the municipality and the industry were reluctant to contribute to this institutional change and as a result, the problem remained. This reluctant to change was mostly due to the enduring lack of know-how concerning planning, maintenance, operation and equipment at both municipality and industry (Buclet & Godard, 2013).

The new party in 1969 became the turning-point and introduced the federal waste act, Germany's first uniform waste law (The Umwelt Bundesamt, 2014). The local responsibility of waste moved from the ministry of health to the ministry of the interior. Together with this change, a far-sighted and comprehensive plan was established. This included a shift in the waste disposal authority to a higher level of administration, application of polluter pays principle, develop waste disposal plans in accordance with regional planning, creation of adequate capacities, financing research for alternative waste treatments and focusing on the recovery of the earlier contamination (Buclet & Godard, 2013).

During the legislative procedure of this act, the overall authority agreed upon the need for a federal framework to support the requirements to overcome conflicts between municipalities. The mediation committee was assigned to regulate and set compromises between the conflicting local authorities (Buclet & Godard, 2013).

At this point in time, the responsibility of waste management was still with the municipalities. Yet, the discussion on co-operation and the realization of economies of scales in waste management continued up to 1971. As a result, 1972 act integrated those recommendations of the central office of management, forcing the waste disposal authorities to co-operate on a more centralized level of districts. The environmental program on which the act was reflected upon, stated that the technical and hygienic aspects could only be economically interesting if large amounts of waste were supplied to the Waste Disposal Authorities (WDAs) (Buclet & Godard, 2013). In other words, their resources of waste input required to be of a certain scope in order to work efficiently.

The 1972 act imposed uniform standards concerning the processing to which these WDAs had to comply. If the WDA did not comply these regulations, the facility could be closed straight away. The WDAs were held responsible for their waste, yet the traditional local task of waste management shifted to the districts to facilitate the creating of a large stream of input as well (Buclet & Godard, 2013) as the recommendations suggested. By doing so, the advice given by the central office of waste was acted upon.

Furthermore, the act stated that the Federal council is authorized to intervene in the waste management market in case of any disproportionately high costs (ibid, 2013). This power of one actor to arbitrate addresses the coalitions between these organizations.

Thereafter, the responsible authorities (WDAs) were uncertain about possible future investments. Each region was therefore obliged to draw up a waste disposal plan to communicate their objectives. However, the desired results were delayed due to difficulties, political disagreements and conflicts during the 1970s. Several municipalities desired to hold their responsibilities, thereby creating uncertainty. The residual and organic waste of households remained the responsibility of the municipalities. The federal jurisdiction still determined to shift the organization to districts and thus enlarging the areas of organization (ibid, 2013).

The situation remained uncertain till the 1979. There was a disparity between the interest of regional planning and the wishes of the local authorities. Eventually, the municipalities recognized the necessity to create large units to provide the organizational,

technical and financial resources needed. For example, it allows larger transport vehicles, making the collection more efficient. Another example is the tremendous decrease in unauthorized waste dumps. Thus, enlarging the areas enabled an efficient, relatively environmental friendly and cost-effective waste management system (ibid, 2013).

#### **5.4.2. WASTE PROCESSING**

After the oil crisis, a federal pollution control act was established in 1974. This act focused on recycling waste and in so doing had a great importance for the development of waste management (Buclet & Godard, 2013).

In 1975, the federal government together with the industry and scientists developed a detailed and systematic analysis of the situation(WMP75). As the government was very much engaged with improving the situation and the environmental issue of waste, the idea that resources were 'limited to growth' (Meadows, Randers, & Behrens, 1972) was very much taken into consideration. However, the plan derived from this analysis was still on a voluntary basis(ibid).

This changed during the disposal emergency in the end 1980s. The emergency represented a situation in which the country was facing a decline in landfill capacities and the conflicting municipalities. Consequentially, the plan was reinforced and priorities were to handle effectively(ibid).

The WDAs had the same priority to recover from this emergency and therefore started to separate waste at source to increase the possibility of recycling. In fact, they were the driving force in establishing a voluntary separating waste collecting system. This system was supported by local campaigns. Besides, the WDAs realized that the only way to overcome the conflicts, and thus to change the discourses, was to avoid and pursue the changes in order to buildup acceptance.

To achieve these large amounts of waste, the WDAs are organized in such a way that the waste can be treated once collected. Thus, instead of focusing on separation of the entire waste cycle, Germany's waste system focuses on the treatment of the various waste streams. One type of waste stream is to be collected and treated by one and the same company (Nobbe, personal communication, May 9, 2017).

The voluntary waste system succeeded in the waste streams that offered economic benefits. However, the ministry decided to move from a co-operative regulatory style on a voluntary basis towards a policy of intervention. This was done in order to overcome certain problems (The Umwelt Bundesamt, 2014).

In 1993 a technical instruction on waste from human settlements (TASi) was established to determine the treatment of solid waste by WDAs. This instruction included guidelines for the processing of various waste streams. These regulations were to be fulfilled by the year 2005, allowing the WDAs to establish an investment plan(Buclet & Godard, 2013).

In the end, these changes and decisions taken over the years evolved in a waste management system operating from an environmental friendly standpoint. The federal

waste management act has been amended and adjusted over time, eventually becoming the current waste management act in which a five-level waste hierarchy has taken into consideration. As a result, various types of waste should be collected separately to maximize its potential which is necessary to maintain specific standards for recycling. These are managed in Germany via various waste treatment advanced techniques of the WDAs being supported by the UBA (The Umwelt Bundesamt, 2014; Buclet & Godard, 2013). Besides, the waste management system is totally financed by fees, no subsidies. The principle of 'polluter-pays' applies (Nellesa, et al., 2016).

## 6. CROSS-CASE ANALYSIS

The following chapter analyzes the three cases based on information given in the case descriptions. The analyzes are structured according to the four dimensions of the policy arrangement approach mentioned in chapter 2. In doing so, it reflects on the operationalization and reveals the influences of the policy domain on the use of anaerobic digestion. Chapter 7 will then conclude by means of multi-level governance.

The three cases point at the same structures of society, the problems and solutions to overcome. The recurring information revealed the influence of the four dimensions on the organization of waste management.

### 6.1. ACTORS

There are similar actors involved in the policy domain of waste management in the three cases. These actors are the municipalities, waste management companies, and the businesses producing waste. Yet, the role they take and the coalitions among these actors vary.

#### 6.1.1. COALITION OF MAIN ACTORS

There is a difference in the council's role between those that do make use of the AD technology, and those that do not. What the research showed it that the case which does not make use of the AD technology solely perceives to be responsible for the household waste. The organization of waste management has remained the same over years and the coordinators rather take a passive role towards waste management (Kuperus, personal communication, May 12, 2017; Streutker, personal communication, May 16, 2017). Coalitions rather derive as they pop-up, but the council does not actively seek to arrange the system differently. An example thereof is the collaboration between Hoogeveen and De Wolden, which was established because of economic reasons and increase their knowledge. However, it does not concern the collaboration in the field of waste management. This is related to the lack of resources.

The municipality is the dominant actor in the coalition. In fact, the waste management companies comply to their needs. Even to the extent that Van Gansewinkel separated their service to be able to compete on the market (Dankelman, personal communication, May 29, 2017). As the price is leading, it requires the waste management companies to push the boundaries. Therewith, the system causes uncertainty, making the waste management companies very much dependent. It shows that there is little coalition between the council and the other actors.

When considering Ameland, there has been a shift in the coalitions and the responsibility each actor takes. Ameland states, like De Wolden, to be solely responsible for household waste. However, they consider its role in a more active form to ensure correct waste handling. They actively seek for appropriate waste handling methods, including the services for the commercial waste sector. They try to guide the waste-producing companies and actively communicate with the waste management companies concerning these

operations. This active attitude reflects in the coalitions, as there is more interaction between the council, waste management companies and waste-producing companies.

Ameland collaborates with the waste management company based on a long-term commitment. As Omrin originates from a collaboration of municipalities, all shareholders pay a certain amount on a yearly basis. Therefore, Omrin units and bundles various municipalities to optimize their services. This system differs from the public tender, giving ensuring operations in the long-run. Due to this structure, they are more involved in the policy making and offering the best service regardless of the fixed prices charged.

Besides, an active council is more likely to seek for the necessary information with consultancy companies when aiming to improve the system. They are more concerned with finding the correct expertise with consultancy companies. The consultancy companies are often waste management companies themselves having the knowledge on know-how of organization, which is elaborated in the resource section. Remarkably, these waste management companies are not concerned with niche markets due to the organizational structure explained in 6.1.3. As a result, the advice of the consultancy companies does not involve niche markets.

#### **6.1.2. NATIONAL AUTHORITIES**

The national authorities are hardly involved in policy-making in the Netherlands. This is remarkable as the knowledge to improve the policy domain is situated with the national government. The rules and regulations are set on a national level based on the knowledge necessary to do so. However, the impact of this knowledge is limited as it is communicated insufficiently towards the local authorities. The communication to the local authorities is lost, affecting the resources (know-how) in the policy domain. The collaboration of the national authority with the other actors is limited and insufficient.

The upcoming movements in the sector and the increasing interest in improving the waste management systems, have created a new rationale for both national and local authorities. In fact, these alterations made the government consider improving their communications by means of project, which are currently developed.

#### **6.1.3. ORGANIZATION OF WASTE PROCESSING**

When considering the entire waste management chain, it appears that the Netherlands has arranged the waste 'life-cycle' into separate entities (see figure 5). This means that there are various companies for the collection, recovery, processing, disposal methods operating all independently. As a result, the chain is inefficient and costly.

In fact, some processing techniques require more attention than others due to the complexity of the treatment or the high potential of risk, like category 3 waste. For example, category 3 waste requires special cleaning processes, expertise, expensive technology and careful monitoring. However, as one company is in charge of collecting all sorts of waste streams, the company is unable to focus on these special treatments. The treatments would consume too much time, money and expertise. It is therefore of little concern to the waste-

management company to seek for the best solution. Uniting the various facets in the chain would increase the efficiency in terms of treatment and control over the input, in particular for category 3 waste. This waste stream has a high potential and is therefore restricted with regulation. However, the different companies carry the responsibility for the correct treatment. If not, the company might risk high fines. As a result, each company checks the input received from the previous faced in the 'life-cycle', making it very ineffective and costly.

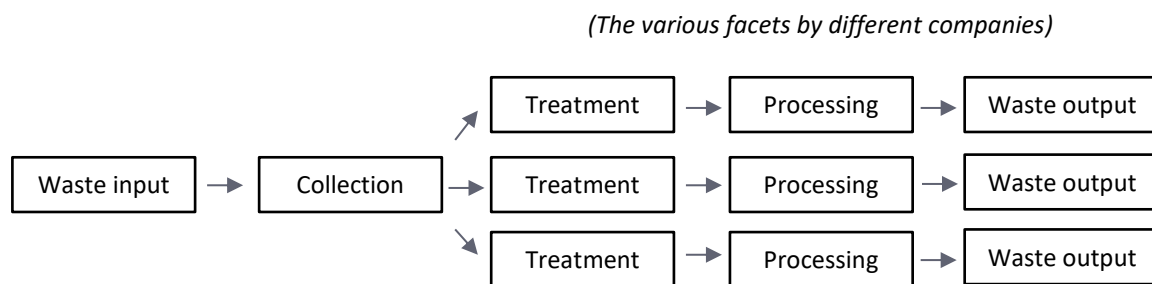


FIGURE 5: VISUAL ORGANIZATION OF WASTE MANAGEMENT COMPANIES IN THE NETHERLANDS

#### 6.1.4. GERMANY

The difference lies with the organization of waste management. The organization in Germany occurs on a larger scale even though the responsibility remains with the municipality. It is organized for an entire district, making the various municipalities collaborate to arrange the waste management system, whereas the Netherlands organizes the waste management per municipality.

The collaboration between the various actors seems to be similar to the collaborations at Ameland. Even though it is not necessarily their responsibility, municipalities are more concerned with correct waste handling. However, as it is organized on a larger scale, the system runs more effectively, being less time-consuming for the council. The waste management company collaborate with the district and not with each individual municipality.

It is also interesting to see that the national government of Germany did succeed in the communication on regulation and resources by means of advisory groups. The Federal Health Organization assigned scientific committees and consultancy companies during the 1990s. Whereas these consultancy companies are the waste management companies in the Netherlands, Germany's national government assigned these actors, therewith passing on their knowledge (resource).

When comparing the organizational structure to Germany (see figure 6), it is evident that uniting these companies will lead to better use of the incoming waste. It will not only enable them to track the waste more easily, it will allow them to control the treatment of waste. When an excessive waste stream appears, they are more inclined to look out for an alternative and more valuable way of disposal.

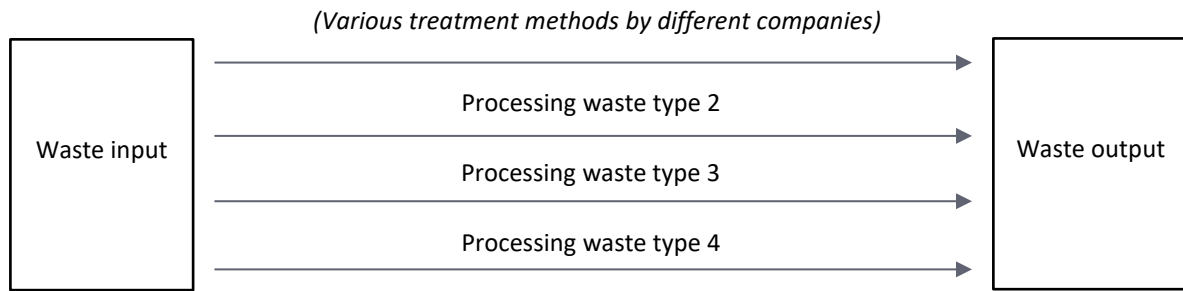


FIGURE 6: VISUAL ORGANIZATION OF WASTE MANAGEMENT COMPANIES IN GERMANY

## 6.2. RESOURCES

The resources available are linked to the coalitions of the actors and are related to the development overtime. The coalitions either enable or restraint actions from happening, but technological improvements seem to breakthrough earlier barriers. The resources involved are divided into three main findings.

### 6.2.1. KNOW-HOW

The most important resource that influences the policy domain is the lack of knowledge. This lack is a repetitive problem with the municipality's council, waste management companies, consultancy, and the citizens. In fact, only the national government and ReFood, an exception to most of the waste managing companies as it uses the AD technology, hold the knowledge. It implies the complexity of waste management. Moreover, waste management has gone through some major changes over the last couple of years, making the management thereof more complicated due to regulations, waste sorting and service matters.

As the council places a proposal on the public tender specifying on the conditions of the waste management, it is important that the council is competent to develop such a plan, including the knowledge concerning rules. However, the research revealed that this is often not the case. This lack of knowledge is common among municipalities and limits their action (Dumont, personal communication, May 16, 20016). The two cases studied are relatively small municipalities. De Wolden even collaborated with Hoogeveen to bundle their knowledge and work more effective, but it remains limited. If both municipalities have limited knowledge, the situation remains the same. In addition to this example, the coordinators spoken to, admitted their lack of knowledge on the matter (Streutker, personal communication, May 16, 2017; Kuperus, personal communication, May 12, 2017). Both councils therefore requested the help of a consultancy company when developing a new proposal. These companies are often waste management companies themselves, yet operating in a different area. This invoked consult concerning the practicalities of waste management is simultaneously with the aim of developing an appropriate application. However, as the waste management companies are not able to focus on specialized treatments, the same knowledge keeps circulating. Once finished, the further handlings are

executed by the council for as long as the contract lasts. If any modifications take place during these years of contract, there is no direct know-how available on the implementations thereof. Thus, the council needs to actively request the knowledge. Besides, De Wolden has limited insight into the actual situation as it still operates with the old system. Old administrative systems are paper based and manually, making it difficult to track waste streams and to anticipate to any complications. Consequentially, this deficiency leads to an insufficient awareness concerning the necessary improvements.

In addition to this knowledge on waste management, the council often forgets to link the waste management to the energy agreement. It seems that the councils are not aware of the potential waste can offer for renewable energy. It indicates the 'sectoral thinking' (Dumont, personal communication, May 29, 2017)

This same lack of know-how is seen with the citizens and the companies, even though the necessary tools exist. Due to the free market of commercial waste and the lack of guidance, the waste-producing companies tend to go for only the residual waste container, as all sorts of waste can basically be thrown with the residual waste. The companies mention that the only reason for changing would be because of economic reasons. However, this is in contrariety as the companies assume that the separate waste collection of category 3 is more expensive. However, if they would calculate the difference, waste-producing companies could notice that separating the waste is in fact cheaper than disposing it as residual waste.

### **6.2.2. FINANCING THE FACILITIES**

The council's only resource needed is the ability to finance waste management. As the waste management companies invest in the resources per municipality, they can calculate the costs thereof in the price offer. In other words, it is a matter of investment to obtain the necessary resources.

As simple as that may sound, an investment concerns enormous costs due to the scope of doing an investment. The high price is owned to aligned system of the components of each resource. The containers are assembled based on a system that matches a certain vehicle. This system differs from the old (paper based) system to the new 'diamant' system which is fully automated. One can imagine that the cost of a fully automated system is higher than the traditional system. Thus, if a municipality is willing to invest in a new system, enabling them to gain more insight into the situation and foresee problems, the costs will rise. Nonetheless, both waste management coordinators stated that they do not encounter any financial barriers (Streutker, personal communication, May 16, 2017; Kuperus, personal communication, May 12, 2017). In fact, Ameland is already operating with the new system, enabling them to collect both household and commercial waste, to incorporate the regulations and to overcome practicalities such as payment.

Exploring the limitation of finance further, the organization of the waste management system, as explained in the section on actors, is structured in a way that the investment in a specialized technique and central processes is an inordinate cost. It is not the main concern

of the waste management companies to apply such a technique. Moreover, it is less costly for the waste management company to dispose the category 3 waste with the residual waste, than investing time and money on the anaerobic digestion technology. A technology such as AD requires a large financial investment and a sufficient input to make it profitable (Nobbe, personal communication, May 9, 2017; Hoogland, personal communication, May 29, 20017). It is only beneficial if large waste streams are created, requiring waste sorting of category 3 at source. ReFood proves that it is possible to create these large inputs, as they collect this category at source by means of their own contracts.

### **6.2.3. TECHNOLOGY**

The developing technology has influenced the policy domain in two ways.

In the beginning stage of the AD technology, it was ineffective system, making the use of the technology was not profitable. However, the techniques have changed over the past 10 years (Hamer, 2003). Even though this is not necessarily new information, the improvement of the technology can now convince waste-producing companies once giving them the financial insight. If large input streams are collected and the correct treatment has been given, the waste management company can economically benefit from the heat, energy and fertilizer produced. Thus, the recent innovations helped to develop a business model, making it more interesting to invest in the use of the AD technology.

Another influence is the technical development of administration systems. Municipalities are obliged to track and register the waste produced. However, the systems to do so enhanced over the past couple of years. Whereas the old system used to be paper based and needed to be controlled manually, the new technology enables fully automated systems. As a waste stream needs to be traced from its beginning till the end, the paperwork piles up with every step it takes. These piles of paperwork need to be registered manually, making it difficult to ensure an overview. Thus, the new automated system facilitates and enables the municipality to monitor their waste streams.

### **6.2.4. GERMANY**

In comparison to the Netherlands, it is clear that the organization led to different resources in terms of technology, financing the facilities and knowledge.

Firstly, the national government assigns committees and actors to transfer the know-how from a national level to the local level. This enabled them to pass on the information to the local actors and waste management companies. The councils and waste management companies can request information by means of these advisory groups. It seems that the communication between national and local or regional authorities functions more effectively than the Netherlands. Waste-producing companies' and waste management companies' ability to anticipate has enlarged, giving them the knowledge to improve over the previous years. The UBA is the organization that supports them in knowledge and technology transfer instrument (The Umwelt Bundesamt, 2014).

Secondly, Germany is highly advanced from a technological standpoint in general. This also accounts for the investment in the AD technology. This is partly related to the organization of the waste management as explained earlier. Each waste management company can focus on the treatment of one specific technique. By doing so, it can create large streams of input, making it worthwhile to invest in the treatment thereof. Thus, the influence of technology confirms the statement that the waste system succeeds for those having an economic benefit (Buclet & Godard, 2013). It is unknown whether the municipalities make use of the new administrative system.

The latter also indicates that Germany is capable to finance the facilities as the AD technology has been adopted across the country.

### **6.3. RULES**

Despite the European and national regulations and policies, these are of little impact on the management of waste. The regulation 1069, which is formally binding, does not seem to affect the organization of waste in the Netherlands, nor did the plan of action have an enormous impact. The only effective regulation for municipalities is the obligation to organize the household waste sector. Due to this commitment, the municipality is idem aware of the free-market of commercial waste, and thus waste-producing companies are responsible for their own waste disposal.

#### **6.3.1. REGULATION 1069**

The research unveiled that, despite this legislation, category 3 is rarely managed separately. As a matter of fact, there is a great ignorance towards the existence of this regulation at the municipality, waste management companies and businesses involved. This ignorance can be dedicated to the lack of know-how. After all, the waste treatment of category 3 is a specialized technique that requires a team of experts in order to comply with this regulation. Even though this is not an excuse for the ignorance, it does clarify why the regulation is not pursued.

Interestingly, it seems that the regulations are not persuasive enough by themselves to alter the system. In the case of Ameland, Kuperus indicated that raising the regulation only confirmed and backed up their motivation to change (personal communication, May 12, 2017). It was the decisive moment to reorganize the system, yet not their main incentive. It is obvious to say that it is important to increase the awareness of this law, but it will most likely not lead to radical changes towards the use of anaerobic digestion. Thus, even though it is a formal regulation and the authorities are provided with the resources, it will not necessarily affect the compliance of this law.

The enforcement of this regulation is only monitored once a waste process is conducted, not whether the fraction is managed separately. In other words, ReFood is checked whether they execute the process correctly, but it is not monitored whether waste-producing companies do waste sorting. The 'voedsel en warenautoriteit' does conduct a yearly check-up on waste sorting (NVWA, 2017), however they accept the waste sorting as it

is when there seems to be no other option (Manje, personal communication, May 12, 2017). A logical explanation is the idea of authorities not being responsible for commercial waste sector, and thus refrain from the regulation that mostly applies to waste-producing companies and stagnate with the idea of having no other option. Even though it should not be used as an excuse, it can explain the little impact of this regulation. Besides, the local authorities could arrange it for household waste as well, yet it is believed that this is too difficult to arrange (Streutker, personal communication, May 16, 2017). This relates to the other dimensions of actors and discourses. Nonetheless, it can be argued whether the responsibility lies with the businesses to comply while the local authorities are neither showing any compliance.

Moreover, as waste management companies act upon the proposal established by the local authorities, it is noteworthy to realize that these local authorities in the Netherlands are not familiar with the regulations for execution. Waste management companies are therefore, besides the treatment of waste, only indirectly involved with these regulations. “The authorities that implement them, are those who should enforce them” (Nobbe, personal communication May 9, 2017). This opinion is shared among the respondents. However, the municipality cannot enforce regulation of which they are not aware of. Therefore, it should go hand in hand with the dimension of resources to make the regulations work effectively. The national authorities are aware of this discrepancy and are trying to improve its communication towards the local authorities (Dumont, personal communication, May 24, 2017).

### **6.3.2. PLAN OF ACTION**

The somewhat voluntary agreements (informal rules) on waste management seem to be more effective (Dumont, personal communication, May 24, 2017). De Wolden motivation to change derives from the plan of action concerning waste.

Throughout the research it became clear that De Wolden is slightly modifying the waste management system because of these goals. The incentive is mostly concerned with the reduction of waste as it is quite clear that achieving the targets requires some essential changes. However, the allocation thereof is for many unclear, which is related to the lack of know-how (Dumont, personal communication, May 24, 2017; Streutker, personal communication, May 16, 2017). This hinders the council from making effective adjustments in the system.

In contrast to the effect of waste management plan, it is interesting to see that it has not been linked to the energy goals. The formation of biogas is important in achieving the sustainable energy goals as explained earlier. However, this valuable additive seems to be forgotten by most of the municipalities (Dumont, personal communication May 24, 20017). Instead, the local authorities seem to focus too much on the reduction of waste, instead of overseeing the complementary function one sector can have on the other.

### **6.3.3. CONTRACT**

Another formal rule is the contract between the waste management companies and the council, which withholds them from making major changes during the contract. Waste management companies facilitate in all the resources necessary according to the policy agreed upon, including the selection on processing companies. This is a legally binding policy, which restricts them from making any improvements. Modifications need to be submitted and approved before doing so. Additionally, the council demands a service in which entire the waste management is facilitated by the company to avoid any nuisance. As a result, waste management companies must facilitate entire services, absorbing the focus and withholding them to concern specialized technologies. Waste management companies are therefore not focused on improving relatively small problems and do not have the time to acquire information on the optimization of niche markets (Hoogland, personal communication, May 29, 20107). Instead, the waste-management companies are more concerned with executing their operations according to the policy agreed upon. Major changes can only be done once the contract is terminated.

### **6.3.4. GERMANY**

When considering Germany, the communication to transfer the knowledge among the different level in society concerning these regulations is managed differently. This refers to the actors and coalitions and shows that the involvement of national authorities differs in two ways.

Firstly, the involvement of and coalition between the national authorities, consultancy committees, and waste-producing companies resulted in an organizational structure in which the organizations check-up on one another, making it a self-regulating system. Such a system is only capable when all actors have the know-how on the matter. While the Netherlands seems to rely on trusting other actors to execute their tasks at their best, Germany requests proposals and comments on each other's actions. Therefore, enforcement of the law should not only be checked by national or local authorities, but it should also involve the organizations possessing the expertise, making it an interactive process among various levels. In other words, Germany has been able to transfer the knowledge on the various levels in society due to various consultancy groups, whereas the Netherlands lack the communication and interaction between various levels.

Secondly, the national authorities in Germany have the right to intervene in case of any noncompliance with the rules. In fact, the waste management companies put themselves at risk to be closed right away. The ability to do so empowers the authority to control. This control seems to lack in the Netherlands. The NVWA does monitor the processing and waste disposal, but it is nowhere stated that they have the right to intervene.

## **6.4. DISCOURSES**

As waste management is mostly shaped by local authorities, it is inevitable that politics have had an influence on the discourse taken. Therefore, it is not surprisingly that Ameland is one

of the first municipalities to organize the system differently, as their willingness to improve marks more fields (Kuperus, personal communication, May 12, 2017).

When exploring the underlying discourses, it showed that the expected discourse on sustainability was not of much influence. Sustainability was addressed when probing, but was not given as an incentive to change. The interviewee repeatedly answered that sustainability is important, but it did not influence the waste management plan. In fact, Kuperus (personal communication, May 12, 2017) stated it to be a “positive side-effect”. This same respond was given by restaurant owners; it is important, but the action undertaken are not incentivized by it (Manje, personal communication, May 12, 2017; Bartelds, personal communication, May 16, 2017). Only the regulations and plan of action developed by the national and European authorities were based on the importance of sustainability.

Analyzing the cases unveiled one dominant discourse that has been raised repeatedly: the responsibility.

#### **6.4.1. THE RESPONSIBILITY**

Studying the discourses showed that waste management is subjected to routines. As waste management is an unintended outcome, it is somewhat comprehensible to think of it as routine based action. Analyzing the cases unveiled that decisions for a certain action were mostly based on routines. The reason for doing so was support by the argument that it had been like that for years (Slagter, personal communication, May 16, 2017; Dolving, personal communication, May 29). Probing to these answers were answered by the underlying reasons of having a routine which simply had not been questioned before as no problems were raised.

The routines also reason the reluctance to change waste management with both the municipality, waste-producing companies and citizens. Waste management companies and the council face unrest during the first year. The citizens tend to complain more and criticize the modifications. It seems that this unrest fades the longer an operation remains.

Subsequently, the habit of managing waste refrains the council to look into the system. The municipality nor waste management company benefit from the unrest that causes. Therefore, preserving the system is given preference over changing. In fact, the coordinator (Dolving, personal communication, May 29, 2017) explained that their action was based on ‘a decision made years ago’. If it was not for practical reasons, Ameland most likely would pursue their waste management system. Thus, the routine seems to take the overhand up to the point where problems become inevitable, changing the discourse.

When asking the waste-producing companies why they decided to organize their waste disposal in that way, they answered that it has been like that for many years. Bartelds (personal communication, May 16, 2017), the restaurant owner, specified that it has been like that for over 10 years. As the government takes no action to inform businesses to organize their way differently, most pursue the current method. Moreover, one container is referred to as the easiest way of disposal (ibid). Whereas some argue the difficulty of changing the routine, the supermarket owner (Manje, personal communication, May 12,

2017) stated that it seems more difficult than it actually is. Thus, there appears to be a certain idea and routine concerning waste management, making it difficult to change.

This passive approach withholds the council to consider only that task prescribed by law. As the law only holds the council responsible for the management of household waste, the municipality having a passive approach, does not consider taking any share in the commercial sectors. It is true that a council is not responsible for the management of commercial waste. However, there is a clear division of opinion on the role of the council. This distinction is explained by means of the active or passive approach.

To start off with the passive role of the municipality, De Wolden clearly addresses the two sectors as different entities (Streutker, personal communication, May 16, 2017). What the research showed is that the municipalities take solely responsibility over its obligations which is the organization of the household waste. He describes commercial waste to be part of a business its profit. Due to this passive role of the council, businesses have no guidance whatsoever in their decision-making for their waste management choices (Manje, personal communication, May 12, 2017; Plaza 't kruuspunt, personal communication, May 12, 2017; Bartelds, personal communication, May 16, 2017). Waste management companies therefore handle the household and commercial waste separately. Van Gansewinkel is a clear example thereof, where the company separated into the public waste management sector and the commercial variant a couple of years ago. This was due to the demand of its customers (Dankelman, personal communication, May 29, 2017). It can be concluded that the municipality's role is rather passive, the businesses sector is a free-market without any guidance, and the waste management companies works separately with both sectors. This passive role affects the policy domain, and thus causes the municipality to organize their system in such a way it is more effective and environment friendly, like the use of AD technology.

Interestingly, this discourse changes when comparing it to the current attitude of Ameland's council. The coordinator (Kuperus, personal communication, May 12, 2017) envisions the two sectors of commercial and household waste differently. Even though they are two different sectors, and both financed by different means, the municipality can still compete on the commercial market. In fact, when doing so, the municipality can economically benefit of it. However, it is important that the service offered by the municipality can compete with the market. It requires a business mind-set. If a municipality can manage this alteration, it is welfares the municipality (Kuperus, personal communication, May 12, 2017). Ameland might have been more concerned with these matters as it is an island. This context creates, as described by the citizens, an 'islander feeling' and the willingness to be autonomous (ibid; Plaza 't kruuspunt, personal communication, May 12, 20017). Ameland altered in this discourse for two reasons. First is the geographical aspect of Ameland being an island having the 'islander feeling'. The second is that the problems the island was facing in terms of waste management became clear. The combination of these two has resulted in Ameland being the 'best practice' of the Netherlands. Therewith, Ameland is the precursor of the Netherlands and exemplifies the

effective organization of both sectors. It shows the effectiveness of the active role, resulting in a stronger governance.

Proposing this idea to waste management companies, once again refer to the current form of organization. Apart from Ameland coordinator, most argue that the demand thereof is currently divided, making it complex. However, Van Gansewinkel is active in both sectors in De Wolden within the same area, thus a combination might even increase efficiency. Exploring this idea further, it shows that Omrin combines both sectors already, which indicate the feasibility. In fact, the enhancing technology reduces the hinder from administrative obligations. But, as De Wolden has no interest in combining the sectors, Van Gansewinkel does not see the need to merge the two entities again. The discourse therefore very much influences the structures of waste management.

#### **6.4.2. GERMANY**

The study on the development of the Germany's waste system revealed similar discourses compared to the Netherlands. However, the discourses were unveiled during the time the adjustments were implied. In other words, Germany already faced the changes of discourses during the 1990s. This does not mean they are not existing nowadays, it rather indicates the dynamics of these discourse and to what extent they are of influence on the policy domain.

During the 1990s, Germany was facing a waste emergency. This state emerged from the practical problems the country was facing. Practical problems derived from contamination and the political influence of striving for a more sustainable management. The incentive to change was in respond to the inevitable problems the government was recognizing. The motivation corresponds to the explanation of Ameland. When exploring this idea further, raising the same question in De Wolden unveiled that they are not facing any problems. However, the same interviewee mentioned that there was little insight into the current state of affairs. In other words, problems might not be raised. This could explain the change in discourse in Germany and Ameland, and the reason to break the routine and change the attitude.

These adjustments caused reluctance in Germany. Instead of avoiding these reluctant arguments, the WDAs decided to pursue their actions to break the routine. This presumption turned out to be effective. Comparing this to the unwillingness in the Netherlands, Germany exemplifies that it is necessary to overcome these routines by pursuing the modifications. The citizens and companies will eventually accommodate these changes and adapt their operations.

## 7. CONCLUSION

This study began with the environmental issue of waste that derives from modern society. To deal with this issue, it is important that correct waste management is implemented. This research explicitly focusses on the treatment of category 3 waste by means of anaerobic digestion. The development in recent years enhanced the technology into a more effective and sustainable way of disposal in contrast to the earlier methods used. The outcomes derived from this treatment are in line with the European and national targets and goals. Nonetheless, the use of this technology varies among countries and areas. Even though the Netherlands and Germany are similar waste societies, the latter is excelling in this matter. Therefore, the following question was raised:

*How does multi-level governance, in terms of the policy arrangement approach, influence the use of the AD technology by studying Germany and the Netherlands on a national and local level?*

To answer this question, three cases were studied in terms of the policy domain on different levels in society. As the research explicitly focused on the influence of multi-level governance on the policy arrangement approach. Germany and Ameland have been selected based on their 'best practices', whereas De Wolden has been selected by criteria demarcating geographic and demographic aspects. The theory central for the analysis is the Policy Arrangement Approach (Buclet & Godard, 2013), which defines policy in four dimensions: actors, resources, rules and discourses.

The conclusion will firstly elaborate on the dynamic of the policy domain effecting the use of AD technology. Thereafter, it reflects the findings of the research presented in chapter 6 into the multi-level governance theory addressed in chapter 2. It will show the interrelatedness of the four dimensions of the PAA. Thereafter, the chapter will recommend on further research and improvements for the policy domain, and elaborate on the limitations thereof.

### 7.1. THE USE OF AD TECHNOLOGY

The research revealed that waste management is strongly related to routines. The routines are so strong that they affect the mind-set creating structures as addressed by the structuration theory. Decisions made since the 20<sup>th</sup> century still influence waste management today. Even though sustainability has become more important over the years, the research showed that it has little impact on the use of AD technology in the Netherlands. This contrasts with Germany, where the sustainability has become the main driver of their waste management system. This can be explained by the political influences. In fact, sustainability is only taken into consideration when developing the national plan of action in the Netherlands. After which the local authority is responsible for the execution of this plan. However, this plan of action is voluntary and little affects the routines of waste management.

It turned out that the routines are only adjusted if problems are addressed. This incentivizes the council to get actively involved in the matter. As a matter of fact, it appears that the encouragement to optimize the system only seems to arise in case of practical problems. However, as waste management is outsourced by the council, making it difficult to overview the situation, practicalities are unlikely to be addressed. Formal nor informal rules will have the desired effect. In fact, the case which is not using the AD technology is not aware of any problems the current system causes, but is neither concerned or aware with the actual current state of affairs in general. This is caused by the by the lack of multi-level governance.

Before going into the multi-level governance, it is important to address the structural problems in the waste management sector. The data unveiled the different waste management structures in the Netherlands and Germany. Exploring these structures showed that the Dutch structures hinder the use of AD technology.

The Dutch waste management sector consists of separate entities that handle the collection, treatment, recovery and disposal of waste separately, making it fundamentally different in the collaboration between actors than Germany. This organizational structure discourages the optimization of waste disposal. It refrains the attention of niche sectors and disables the collection of large amounts of input. Therewith, it distracts waste management companies from operating in niche markets, as it is unattractive to invest in due to the high costs and expertise it needs. Thereby, it decreases the control in the system, making it the waste management sector ineffective.

## **7.2. MULTI-LEVEL GOVERNANCE**

This research demonstrates that the use of AD technology is related to structures in society. In fact, it illustrates the limited effectiveness of ecological modernization and confirms the working of multi-level governance. This form of governance will alter the coalitions of actors, empower them in terms of resources, help to comply the rules and causes a shift in discourse. To further explain the influence of multi-level governance on the dynamics of the policy domain, it is concluded in both vertical and horizontal multi-level governance.

### **7.2.1. VERTICAL MULTI-LEVEL GOVERNANCE**

The vertical dimension refers to the interaction between the upper and lower levels of actors in society. What the research shows is that an increasing vertical multi-level governance positively affects the policy domain concerning the AD technology.

The Netherlands shows limited progress in the developing of a vertical multi-level governance, when comparing it to Germany. Both countries have adopted the European regulations into their national plan of action. However, from that point on there is a discrepancy in the communication of this national plan towards the local authorities affecting waste management. Incorrect communication and the hierarchical structures results in a passive attitude among municipalities. The lack of communication causes a lack of knowledge. This is noteworthy as the municipality's council has the decisive role in the organization of waste management. As a result, there is a lack of know-how regarding

practicalities on how to organize and the European rules, and refrain municipalities from even considering taking a share in the commercial waste sector.

However, if the Netherlands can create a less hierarchical structure that exchanges information on the various levels in government, it would positively affect the policy domain, thereafter increasing the use of AD technology. With municipalities being the decisive actor in the waste management sector, it is important that they have the information necessary to select the appropriate methods of waste collection. Despite the actors and programs established by the national government, the communication is still ineffective. Improving the exchange of information increases the knowledge concerning waste management and allows the system to improve. It would address the regulation 1069 and increase their capacity of know-how on how to modify the system. This would not only lead to a better implementation of the national plan of action, it could also cause a shift in discourse. Moving from a task-oriented municipality towards an actively involved municipality, as the increasing knowledge can trigger the municipality to look into the system. When doing so, they would notice that the current waste management system is inefficient and high in costs. Besides, the awareness regarding the regulation might stimulate them to guide business in their waste management choices to increase the compliance of it, leading to a horizontal multi-level governance.

Waste management companies currently simply adhere to the demands of the municipalities. This is noteworthy as the demands are explicitly stated in the proposal placed on the public tender. It contains the specifications and conditions for operation. However, waste management companies assume that this proposal complies to the rules set by governmental authorities. Yet, as the councils have a lack of knowledge, it makes the structure of the system ineffective.

Thus, the lack of vertical multi-level governance affects the dimensions of the policy domain. If this governance could be established, it would lead to a self-regulating system in which each governmental actor is aware of each other's actions, making it easier to monitor.

### **7.2.2. HORIZONTAL MULTI-LEVEL GOVERNANCE**

The horizontal dimension involves the agreements and coalitions between the actors within countries, regions or municipalities. It is a mix of state and non-state actors that focus on the execution of a policy. The research revealed the lack of multi-level governance in the area.

The first level elaborates on the vertical multi-level governance structure just mentioned. If municipalities were to change in discourse, getting a more active role in the organization of waste management, they would collaborate and communicate with other actors like municipalities, waste management- and waste-producing companies.

Local authorities are currently rather task oriented and therefore solely focus on the management of household waste due to the rules. This causes the common problem of municipality refraining from taking any share in the commercial sector, while the waste-producing companies lack in knowledge. In other words, waste-producing companies are not provided with the resources necessary to decide upon the most appropriate form of

disposal. Instead, they base their decision on the cost of residual waste, like it has been for many years. However, if the municipality would cooperate with both waste management- and producing companies, it would create a win-win situation for all actors. If the municipality would take a more business-like approach towards the commercial sectors, they would even be able to steer the businesses into more sustainable methods of disposal like the separation of category 3 waste. Moreover, it will empower them to steer and guide businesses in their decisions and avoids aggregation of commercial- with household waste. Whereas combining the two waste streams used to be difficult, a new technology enables tracking each of the entities. It enables accurate differentiation of commercial waste and household waste. The improvement in resources therefore empowers the municipality to organize both sectors.

Furthermore, if the municipality would agree upon a long-term commitment with a waste management company, it would enable the waste management to focus on the optimization of waste processing and improving their services. In this way, waste management companies' operations are less uncertain, making it more interesting to invest in new technology. The current structure withholds the waste management companies from investing in these innovations. Investments are per municipality, but contracts are relatively short in comparison to the cost of an investment. Besides, the market for household waste is too focused on the reduction of price, making it difficult to invest in new administrative systems while preserving a competitive price. A long-term commitment would evade this barrier to invest in resources, empowering the focus on the optimal waste treatment of all sorts of waste, and thus optimizing the remaining value of waste.

Additionally, to operate the system effectively and benefit of it economically, it is important to create large input streams. If municipalities were to collaborate in a region or district, it would be more feasible to create these large streams. Besides that, a collaboration between the municipalities would also make the system run more effectively and cost efficient. It would enable bundling their knowledge and improving their services. Thus, a horizontal multi-level governance would help to improve the waste management and encourage the use of AD technology.

In conclusion, the aforementioned information enables to answer the research question by stating that multi-level governance can greatly contribute to the adaptation of the anaerobic digestion technology. It requires the development of vertical and horizontal multi-level governance which will influence the policy domain concerning AD. Multi-level governance has a significant influence on the organizational structures of waste management by altering the discourse, enlarging coalitions, strengthening the resources and increasing the compliance of law, all leading to a more widely adaptation of the AD technology.

## **7.3. RECOMMENDATIONS**

### **7.3.1. PRACTICALITIES**

At this moment, it is important to increase the multi-level governance. The organizational structures of both horizontal and vertical levels need to collaborate and communicate about the improvement and the importance of an appropriate waste management system.

As one of the most influential aspects of the policy domain is resources in terms of know-how, the starting point should be to increase the knowledge with the various actors. The knowledge lays with the national authorities, making it important to firstly focus on improving the exchange of information between the various levels. The increasing knowledge concerning the waste management sector will most likely trigger the local authorities to get informed about their current state of affairs. This will not only reveal the drawbacks of the old system, it will also show the insufficient compliance of regulation 1069. The communication could take place by means of assigned (scientific) authorities having the expertise to advice on the improvement of organizational structures, empowering the local authorities to alter the system and to monitor waste sorting. The increasing knowledge will reveal the advantages of a new waste sorting system. As the initiative to organize differently is with the local authorities, they should be informed about the alternatives and supported to invest in new administrative systems. Such a system is crucial for the insight into the current organization. This should enable all municipalities to control their waste management system accordingly, to overcome problems and achieve waste management and energy goals. It will also empower councils to adjust more easily in the future. These experts could interim help to establish the multi-level governance by coupling municipalities and waste management companies.

Thereafter, it is important to overcome the structural barriers that lay within the system. Waste management companies are unable to focus on optimizing the treatment of all sorts of wastes. The contract based system causes uncertainty, refraining them from making large investments. Therefore, the municipalities should proceed with a long-term commitment to these companies, instead of using the public tender. Instead of focusing on the competition within the market, both municipality and waste management companies can work towards sustainable waste management, including the use of AD technology.

Furthermore, to overcome the structural organization errors, it is important to modify the system in two ways. Firstly, waste management needs to focus on a type of waste, instead of steps along the treatment of waste. It is an alternative organization in which waste management companies focus on one specific waste stream, as it is organized in Germany. A waste management company engages is one sort of waste from its input until the output. This would not only increase the efficiency and enlarge the material for input, it also empowers them to focus and invest in the resources necessary for optimization of the process. Besides, it would allow organization on a larger scale thereby increasing its potential. The various actors in the waste management life-cycle should therefore merge and focus solely on one type of waste, enabling the optimization of the process. Secondly, council should try to operate business-like and see the potential of collection commercial

waste as well. Councils should consider themselves actively involved in the matter, communicating with the various levels creating multi-level governance.

At this moment, there is also a lack of multi-level governance between various sectors. Despite the overlap between the waste management and renewable energy market sector, the municipalities are still too fixated on the waste management sector. The councils seem to forget the link to the energy sector. The use of AD technology supports the goals and targets set for both the waste management and renewable energy sector. Therefore, there needs to be multi-sector governance to complement one another in their achievements, encouraging the improvement in the waste management sector.

Implementing these recommendations will support the goals and targets set on waste management and renewable energy. Overall, the recommendations concern an active role of all actors involved and moving towards a multi-level governance system.

### **7.3.2. FURTHER RESEARCH**

Additional research should focus on the three different areas, enlarging the knowledge concerning waste management.

Firstly, as this research did a brief evaluation on the policy domain of Germany, further research should do a more in-depth study on the executive roles (regional) and coalition on waste management in Germany. Even though the brief analysis has been invaluable for this research, more practice-oriented conclusion could be drawn from a more extensive research.

Secondly, this study only concerns two municipalities. The cases selected were of great value for this research. Nevertheless, studying other cases enriches the information found throughout this research. It could add and exemplify real-life situations and complement on the conclusion and recommendation. Moreover, as the waste managements is uprising now, it would be interesting to track the developments and to see the effectiveness of multi-level governance, hence implemented. Some of the respondents in fact already referred to other cases making somewhat use of multi-level governance for economic reasons. This should be researched subsequently.

Lastly, further research could investigate the policy domain of urban areas. It turned out that it is impossible to compare a policy domain of a rural area with that of an urban area due to the geographical and demographic inequalities. It would therefore be interesting to see what the influence of multi-level governance would be on the policy domain of urban areas.

## 8. REFLECTION

The reflection discusses the process of the research and the way it has been conducted. Conducting the research has not been much of a burden. In fact, I enjoyed the process of taking the interviews and analyzing the first-hand information. However, I did struggle with two facets: the writing and the given time frame.

The actual start of the research had somewhat been postponed. The reason for doing so is that the pre-masters students had to deal with an extra class during the third period. The additional course was qualitative methods, which is a quite intensive course. It has been useful for the set-up of the research, but it was time consuming. Therefore, I feel that the start of the thesis had been delayed.

Even though the set-up and demarcation of the research was done quickly, it did not reflect on paper. As I was still focusing on the research set-up and searching for the appropriate methodology, I found it extremely difficult to translate those insights on paper. This was partly due to my incompetency in writing. To overcome this problem, I have intensively attended several courses of the academic writing center and participated in an English course. Both enriched my writing skills and helped me to put my words of thought on paper. In addition, as the research developed, I was able to use more accurate language and to grasp the complexity of the waste system, making it easier for me to express myself.

Another point to address is that when I started off the research, I definitely underestimated the complexity of waste management. The organization of waste management is complex. What makes it even more difficult is that some actors involved were not even familiar with the waste management system themselves, making it extra difficult to fully understand the situation. This has challenged my interview techniques, required me to make sure I understand the information provided, and subsequently what questions to probe for. Even though this has been challenging, I do believe that I handled this correctly. The interviews were extensive and rich in information. Nevertheless, the interviews did lack some specific information on dates, times and names. This information is obviously important when trying to write in a very structured manner for the reader to understand the situation, especially when explaining a complex matter. However, I did not gather this information during the first interviews, requiring me to contact the interviewees afterwards. This has been a learning moment for my next thesis which will help me to improve the structure and readability.

Besides the struggles of structuring and writing, it also took me a while to figure out to what extent information is relevant. Consequentially, I was trying to note down all the information gathered during the process, making it perhaps more difficult than necessary. As a result, I have spent my time ineffectively by writing chapters and paragraphs superfluous for the final version.

Furthermore, the set-up of the research has perhaps been a bit too ambitious for the scope of time, when taking into consideration the complexity of the topic. It took me quite some time to actually understand the waste management system. The interviews took up to 2 hours for the interviewee to fully explain the situation. Keeping this in mind, researching

the two Dutch municipalities alone would have sufficed the number of hours set for this bachelor thesis.

However, adding Germany has been critical for the understanding of the policy domain and drawing conclusion. The only difficulty thereof has been arranging interviews with German actors. It turned out that the people working in this sector are not necessarily the most internationally oriented people. I have had difficulties with overcoming the language barrier. Luckily, I have had great help of my German roommate. However, despite his great efforts in translating and contacting the information, and my wide-ranging and all-embracing search to find respondents, I did not manage to arrange an interview with a German respondent. I also underestimated the difficulty of a cross-country analysis. This taught me to consider practicalities next time such as the language and distance barrier before selecting a case. Even though my choice might have been a bit naïve, I would have made the same choice if I would redo the research.

Lastly, I tried to make use of Endnote, the referencing program. As I got used to using RefWorks during my previous studies, I decided to use Endnote for this thesis. The program is offered by the university. However, the program has been very much malfunctioning during the research. For some reason, it has been changing the references, causing errors, mistakes and what not. This has been very time consuming and frustrating in the process. Therefore, I learned that I will not ever use this program again.

Overall, this research helped me to improve my writing skills, while enjoying the process of researching and gaining an in-depth understanding on the topic. It enabled me to apply an abstract theory to a real-life case, after which can be drawn conclusions once again on a theoretical level. Therefore, it has been a great practice for my master thesis.

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## APPENDIXES

### APPENDIX 1: INTERVIEWEES

**Benjamin Manje** (Ameland)  
Owner Supermarket de Spar  
May 12, 2017 14:30

**Bert Hoogland** (Ameland)  
Coordinator Omrin  
May 29, 2017 16:00

**Carl Streutker** (De Wolden)  
Waste coordinator of the municipality  
May 16, 2017 11:30

**Hans Kuperus** (Ameland)  
Waste coordinator of the municipality  
May 12, 2017 10:30

**Harry Dolving** (De Wolden) – By email  
Waste coordinator of the municipality  
May 29, 2017

**Jan Bartelds** (De Wolden)  
Restaurant owner Zuidwoldiger Huuskamer  
May 16, 2017 12:30

**Johan Nobbe** (Ameland & Expert)  
Key Account manager ReFood  
March 21, 2017 11:00  
May 9, 2017 15:00

**Klaas Slagter** (De Wolden)  
Waste Coordinator of the municipality's recycle center  
May 16, 2017 14:30

**Matthieu Dumont** (Expert)  
Senior advisor Bio-energy  
May 24, 2017 10:00

**Marcel Dankelman** (De Wolden)

Coordinator Van Gansewinkel Overheidsdiensten B.V.

May 29, 2017 11:00

**Plaza 't kruuspunt** (Ameland)

Restaurant owner (name unknown)

May 12, 2017 14:15

## APPENDIX 2: INTERVIEW GUIDE

### Vooraf

1. Voorstellen: Op dit moment doe ik een pre-master Geografie, planologie en milieu aan de Radboud Universiteit Nijmegen. Hiervoor doe ik momenteel onderzoek (scriptie) naar afvalverwerking. Wanneer ik dit heb afgerond, zal ik doorstromen naar de Master Environment and Society studies. Daarom wil ik u graag bedanken dat ik vandaag mag langskomen.

2. Achtergrond: Er worden grote hoeveelheden afval geproduceerd per maand. Echter is er een verschil te zien per gemeente in de verwerking hiervan. Ik wil dit graag onderzoeken om te kijken waarom dit zo is. Om die reden focus is op het organisch en dierlijk afval dat verwerkt kan worden met het de techniek Anaerobic Digestion. Hiervoor onderzoek ik een aantal casussen om zo te kunnen achterhalen wat precies de redenen zijn. Per casus houd ik een interviews met de betrokken partijen, zoals de gemeentes, afvalverwerkingsbedrijven en andere betrokkenen.

3. Doel interview: Het interview is bedoeld om inzicht te krijgen in het beleid van afvalverwerking van organisch afval bij verschillende gemeentes. Het beleid omschrijf ik aan de hand van 4 onderdelen: actoren, middelen, regels en discoursen. Dit betekent dat het verder gaat dan alleen de wetgeving en vandaar dat een dialoog belangrijk is om hier een duidelijk beeld van te kunnen maken. Het interview is geschreven aan de hand van deze vier onderdelen. Het interview bestaat uit 25 vragen en zal ongeveer een uur duren.

4. Vraag de respondent om toestemming om het op te nemen en vertel waarom. Vertel ook wat hiermee gebeurd. De informatie zal uitsluitend voor dit onderzoek gebruikt worden. Verder is het mogelijk om het interview geanonimiseerd te verwerken, indien dit achteraf nog gewenst is.

### Vragen interview

Met de eerste serie vragen wil ik graag in kaart brengen wat uw rol is in de gemeente en in hoeverre u bekend bent met de verschillende manieren om afval te verwerken. Dit gaat over het verwerken van organisch afval in uw gemeente.

1. Kunt u in het kort aangeven welke rol u heeft bij het algehele beleidvorming omtrent afvalverwerking van deze gemeente?

2. Welke verwerkingsmanieren worden er **op dit moment** gebruikt? Welke werden er **vroeger** gebruikt? Heeft u hier gegevens over beschikbaar?

3. Wat zijn voor u de belangrijke **aanleidingen** om op deze manier te werk te gaan? Waren er andere mogelijkheden?

4. Bent u bekend met het vergistingsproces van Anaerobic Digestion?

Anaerobic Digestion (zie bijlage) is een vergistingstechniek waarbij er warmte, biogas en elektriciteit wordt opgewekt. Aan het einde van dit proces blijft er mest over dat weer kan worden doorverkocht aan landbouwbedrijven.

### Actoren

5. Welke partijen (**overheid, bedrijven, maatschappelijke organisaties**) zijn er betrokken bij het organiseren van de afvalverwerking?

6. Welke rol speelt elk van deze partijen? Op welk niveau (Europees, nationaal, sub-nationaal) spelen ze een rol?
7. Hoe ziet de **samenwerking** er uit?
8. Kunt u aangeven hoe dit zich tot elkaar verhoudt door gebruik te maken van de tekening in de bijlage?

## Middelen

9. Welke middelen zijn er nodig om de afvalverwerking te kunnen organiseren? (*Financieel, infrastructuur, mobiliseren, kennis, samenwerking vaardigheden, autoriteit, belasting (ecotax) /subsidie*) Zo ja, heeft u hier voorbeelden van?
10. Vanuit welke partijen worden deze middelen aangeboden?
11. In welke mate bent u **afhankelijk** van deze middelen? Hoe gaat u om met die eventuele afhankelijkheden?
12. In hoeverre kunnen bepaalde partijen die kunnen ingrijpen of besluiten maken? **Autoriteit**

## Regels

Om een duidelijk beeld te krijgen van de situatie, ben ik benieuwd welke regels er van toepassing zijn. Hierbij gaat het om formele en informele regels die gelden binnen de gemeente.

### Formele regels

De formele regels gaan over de regelgeving die vanuit de overheid is opgelegd.

13. Welke wetten en regels zijn er, naast verordening 1069, van toepassing? Op welk niveau zijn deze regels vastgelegd?
14. Op welk niveau wordt dit uitgevoerd en wie heeft inzicht op de **naleving** hiervan?
15. Zijn er bepaalde **regels en/of wetten aanleiding** geweest om gebruik te maken van de huidige verwerkingstechnieken?
16. Zijn er regels en/of wetten die een verandering van afvalverwerkingstechnieken eventueel zou kunnen **belemmeren**?

### Informele regels

De informele regels gaat over bepaalde routines, gebruiken of onderlinge afspraken die er gemaakt zijn binnen de gemeente.

17. Zijn er bepaalde **routines, gebruiken of onderlinge afspraken** op het gebied van afvalverwerking? (*vrijwillige targets, afspraken*)
18. **Hoe en wanneer** zijn deze tot stand gekomen?
19. In hoeverre zouden deze **regels van invloed** bij een verandering van afvalverwerkingstechnieken?
20. **Ontbreken** er op dit moment nog regels en/of wetten? Waarom zijn deze nodig?

## Discoursen

De discourses kijken naar ideeën en concepten die aanleiding zijn geweest voor het maken van bepaalde keuzes.

## Organisatie

21. Middels welke partijen zou afvalverwerking volgens u georganiseerd moeten worden?

22. In hoeverre denkt u dat de volgende partijen **verantwoordelijk** zijn voor dit proces? Waarom denkt u dit precies?

- Overheid (gemeente)
- Bedrijven
- Samenleving (lokale initiatieven)
- Eventuele andere actoren

## Belang van afvalverwerking

23. Waarom is afvalverwerking voor u en de gemeente van belang? In hoeverre is de manier van verwerken belangrijk? Wat is uw **visie** hierover?

23. Zijn er **problemen, belemmeringen** of zijn er **verbeteringen** nodig in de huidige manier van afvalverwerking? Zo ja, kunt u aangeven welke dit zijn? *Op het gebied van:*

- *Middelen (subsidies)*
- *Regels/handhaving*
- *Samenwerking*
- *Organisatie*
- *Techniek*
- *Verduurzaming*

24. Indien er een verandering heeft plaats gevonden, in hoeverre hebben dan **maatschappelijke en politieke veranderingen** een rol gespeeld?

25. Is er op dit moment een **verandering gewenst**? Zo ja, wat is het streven?

## **Afsluiting**

Dit is het einde van het interview. Zijn er naar uw mening onderwerpen die niet aan bod zijn gekomen of heeft u bij nader inzien nog iets toe te voegen?

Het interview zal ik uitwerken in een samenvatting. Ik zal deze binnen een week opsturen, u kunt hier dan eventueel nog op- en/of aanmerkingen over sturen. Mocht ik na 3 werkdagen niks ontvangen hebben, ga ik er vanuit dat het zo goed is. Kan ik, indien nodig, nog contact met u opnemen wanneer er zaken niet duidelijk zijn bij het verwerken van het interview?

Mocht u achteraf nog vragen hebben kunt u altijd contact opnemen. Verder wil ik u nogmaals hartelijk bedanken voor het interview en uw tijd.

E-mail: [b.vonk@student.ru.nl](mailto:b.vonk@student.ru.nl)

Telefoon: \*\*\*\*\*

## Interview bijlage

### ***Dit formulier behoort bij het interview met***

*Naam geïnterviewde:*

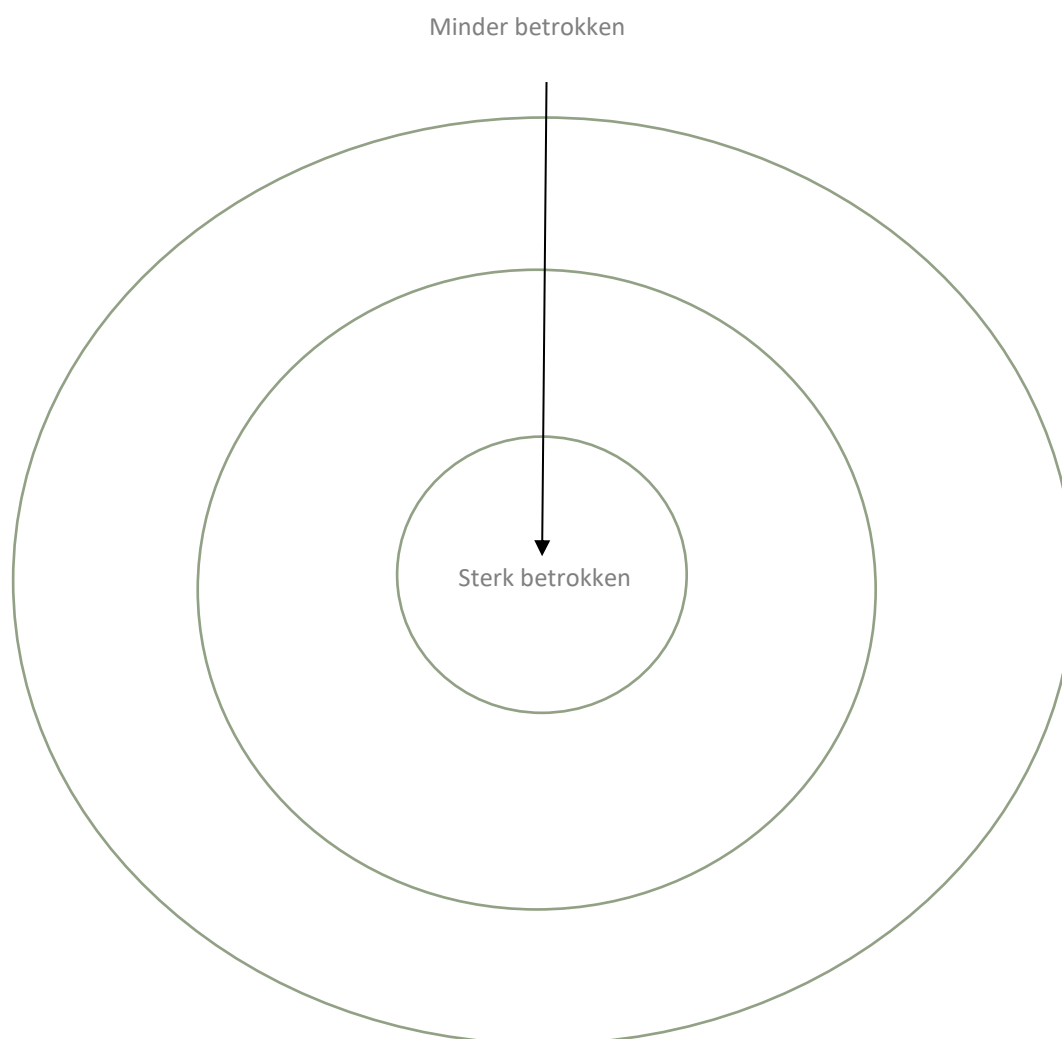
*Gemeente:*

*Bedrijf:*

*Datum interview:*

De tijdens het interview verstrekte informatie zal uitsluitend voor onderzoekdoeleinden gebruikt worden ten behoeve van het beantwoorden van de onderzoeksvraag.

### **Betrokken partijen**



#### **Te denken aan**

- Overheid
- Bedrijven
- Experts
- Lokale initiatieven