Vincent The

Market Research

Heckenpflege mit System, Die Energiequelle Wallhecke nutzen

INTERREG-IV-A-Project Stoken op Streekhout

INSTITUTE FOR INNOVATION AND GOVERNANCE STUDIES / NIKOS
Prof Dr. Aard Groen
Assistent: Suzan Valster
Project coordinator: Raymond Loohuis

UNIVERSITY OF TWENTE

Table of Contents

1 Introduction

The interregional landscape of Münsterland, Graftschaft Benthem, Twente and "de Achterhoek" has several distinctive characteristics. Besides the common activities concerned with the effective management of this landscape there are numerous options to be considered in the management practices that can contribute to aspects of both the regional economy and the environment.

To obtain more insight into the possibilities of strengthening the regional economy, an interregional project has started named Interreg-IV-A "Energiequelle Wallhecke". This research project focuses on monitoring and executing the management activities needed for the preservation of the cultural landscape, while also potentially contributing to a better environment. The project goals include raising both the economic and ecologic value of wooden banks which can result in higher bio diversity and better maintenance. The usage of wood chips from wooden banks as an energy source for CO2 neutral heating systems is considered the main focal point to attain the ecological goal. The most important focal point on the economic value is in the creation of a regional market for wood chips originating from wooden banks. The project started in August 2009 and is due to end in July 2012.

One of the partners in this project – 't Onderholt (a Dutch Agricultural Nature Organization or ANV) – gave the University of Twente a research assignment. The central research question is whether or not it is economically feasible to use wood chips from the landscape management activities as a renewable source for heating systems within the interregional market. However, as literature suggests, developing new markets for renewable energy sources including its technological, infrastructural and legal adaptations is a daunting task with highly unpredictable outcomes *(Garud & Karnøe, 2003; Jacobsson & Bergek, 2004; Jacobsson & Johnson, 2000).* These outcomes are unpredictable because many influencing variables remain unknown. In this sense, this project can be categorized as an innovation journey *(Van de Ven, 1999).* Nevertheless, in order to arrive at an understanding of the current state and feasibility to exploit biomass in both regions successfully, the Universiteit Twente was assigned to conduct market research in the German region.

A similar research project for the Dutch region "De achterhoek" has been assigned to Wageningen University. The insights and conclusions provided by both research institutes formed the material to abstract an innovation journey for the market development in both regions.

The first part of this report is divided in two main sections. The first one (Chapter 7) concerns the supply side (i.e. current infrastructure, including the position of already active actors, availability and property, and technological matters). The second one (Chapter 8) concerns the demand side (i.e. customer preferences, experiences of pilot customers with technology and logistics). We applied both primary and secondary qualitative and quantitative data collection methods and verified the collected data with experts in the field and reflections during intermediate project meetings in Germany and the Netherlands. Chapter 9 presents the conclusions for the first part of this report.

The remainder of the first section of this report is structured as follows: after the management summary (Chapter 2), we first start with some background information (Chapter 3) followed by a problem definition (Chapter 4), research objectives (Chapter 5), and the research questions to address (Chapter 6).

In the second part (Chapter 10), we further elaborate on the conclusions of the first part and develop an innovation journey for each region. In developing these projections, we also rely on the results for the Dutch region which are provided by the Wageningen University. In developing such journeys, we draw on the framework for establishing emerging markets *(Möller, 2010; Möller & Svahn, 2009)* including enrolment of multiple private and public actors *(Callon, 1986)*, and mobilization of resources such as properties and knowledge *(Garud & Karnøe, 2001; Karnøe, Kristensen, & Andersen, 1999).* The conclusions of the innovation journey are presented in Chapter 11 to conclude this report.

2 Management Summary

Market research to obtain a better understanding of the market structure for wood chips, originating from maintenance activities on wooden banks, was conducted in the Münsterland region. This region is composed of the districts Steinfurt, Borken, Warendof, Coesfeld and the county of Benthem. In this research attention was given to the supply side (i.e. current infrastructure, including the position of already active actors, availability and property, and technological matters) and the demand side (i.e. customer preferences, experiences of pilot customers with technology and logistics).

2.1 Supply

The total possible volume of wood chips from wooden banks in the research area is between 1.000.000 to 1.875.000 m^3 of wood chips. The total percentage of wooden banks to be acquired is estimated to be at most 50%, which results in a total feasible amount between 500.000 to 937.500 m^3 per year. 90% of the wooden banks is privately owned, 10% is owned by municipalities. A substantial part of the privately owned wooden banks is not maintained regularly.

In the supply structure two key actors can be defined: the harvesting contractors responsible for pruning the wooden banks, and the Heckenmanagers responsible for the acquisition, categorization and tender process of a regional bundle of wooden banks. The harvesting contractors have a dual role, besides the maintenance activities they also act as the suppliers of wood chips to the consumers. The Heckenmanagers will have a role of increasing importance as the acquired volume rises.

Most of the wood chips originate from maintenance activities at natural elements (wooden banks, forests & road side). The market infrastructure is sufficient to enable suppliers to deliver wood chips at a constant low humidity level; storage capacity isn't a limitation in the supply chain either.

The market does not operate on balanced ecological and economical values. It is uncertain if the market behaves within the goals set by this project; it is however safe to state that the economic aspect currently dominates. The sheer logistics involved in moving wood chips around does act as an ecological limit, based on economics nonetheless. The total demand exceeds the current supply.

At this moment there are no quality standards for wood chips. The efforts being made on creating a framework for quality assessment and on building a quality database will greatly improve the ability of harvesting contractors, technology suppliers and customers to communicate in an effective and efficient manner. As different quality classes become clearly defined the usage of wood chips will become much easier.

2.2 Demand

There are no real limitations for the adoption of wood chips as an energy source for heating. The only cause for concern is the lack of a quality system for wood chips. The technology used is stable and there are many different suppliers. The suppliers do have some doubts about the economic feasibility of smaller installations.

Some legislation is available which might help the adoption of renewable energy systems in general. Because of the loose definition of what renewable sources of energy are, the real impact for the adoption of wood chips might be somewhat limited.

Although the long-term availability of fossil fuels and the price increase are widely accepted, these fuels are still the most accessible sources of energy. Data from the survey does provide some hope, since it acknowledges the acceptance of biological alternatives. Between the different alternatives wood chips score well on both price and total ecological impact, the lack of quality indicators are an important issue though.

Economical motives are most important when a choice for an energy source has to be made. The customers are willing to accept higher maintenance costs on the condition that operational costs are significantly lower. The total cost of ownership is what really matters. Wood chips are certainly on the shortlist of energy sources for new installations; they form an accepted alternative.

According to the forecasts on price development of oil, wood chips will soon be an economically interesting alternative. The German government has set a challenging goal and created a successful system of subsidies.

Within this system and with the known limitations in available volume of wood chips problems with demand shouldn't occur. With prices for wood chips rising the total costs for the owners of wooden banks should be lower, a profitable exploitation of the wooden banks might be attainable in the near future if sufficient scale is realized.

2.3 The innovation trajectory

Recently there is much debate about the usefulness of marketing literature for practitioners. Central in this debate is the question whether marketing planning is a straight forward linear process or a nonlinear and interactive process.

The available data create a clear view of a developing system in which innovation takes central stage, hence we choose to adopt and adapt the framework of Möller *(2010)* which describes a non-linear and iterative process. The adapted framework consists of three phases; sense-making and agenda construction; mobilization and institutionalization; and enrolment and counter enrollment.

The Dutch innovation journey is primarily concerned with the reduction of uncertainty to enable the creation of a market. The involvement of local governmental bodies is essential to reduce the uncertainty as the inconsistent application of legislation is the main source for uncertainty. With the help of the adapted framework a new network of actors can be built in the Netherlands to enable a service provision to the customer. With the actors in this network the uncertainty for all actors (including the customer) can be greatly reduced, which will aid the adoption of wood chips for heating.

However, the low supply volume directly affects the total number of customers that can be serviced from the current source. Just a handful of customers are enough to consume the yearly supply. If the uncertainty can be reduced sufficiently, it might be interesting to look at other sources of wood chips. Only one part of the ANV role (the role of supplier) will shift, all other actors will remain the same.

In the German region the role of the Heckenmanagers is crucial to the future of this project. In the current situation the economic aspects rule the market. Because demand exceeds supply, the market forces will not take regional and ecological perspectives into account automatically.

When applying the framework to the German situation thought has to be given to the position of the Heckenmanager as controller and coordinator of the flow of wood chips. They should be able to set the operating standards and enforce a regional approach in the usage of wood chips.

At this moment the usage of wood chips as a renewable regional source of energy is not economically feasible for all actors involved. With the expected price development this can change in the near future if sufficient scale is achieved. The support of the Wall-IS system might be crucial to create this scale.

3 Regional and social relevance

3.1 History of the regional cultural landscape

The cultural landscape of the area of investigation has developed over an extensive period. In the past the landscape was dominated by small farms and pastures, surrounded by wooden banks. The wooden banks had multiple functions, besides demarcation of the pastures they also provided shade for the animals, and they were used a source for firewood.

With the introduction of barbed wire, the primary function of the wooden banks was lost. In the same period mechanization of the agricultural sector led to an increasing need for larger scale farming. The many small farms and pastures slowly disappeared, pastures were merged together to simplify management.

Figure 1 - Fotograph of the Dutch cultural landscape taken from a hot air balloon

3.2 Social relevance

As part of a sustainable way of living people ask for an increasing amount of attention for the development of alternative sources of energy.

(van Dijk et al, 2003)

With the growing public awareness on the topic of climate change and the perceived human impact thereon, it seems ever more logical to explore the possibilities of the available renewable energy sources. The wooden banks have an important role in the cultural landscape or bocage, however the maintenance of these elements is perceived as a financial burden. The old secondary function of the wooden banks (as a source for fire wood) has generated extra attention. The efforts that are being made to preserve the cultural landscape

can be linked with the need for a sustainable and renewable source of energy, possibly in a way that is interesting both economically and ecologically.

3.3 Project History

The maintenance activities on the wooden banks in the region produce large quantities of wood chips on a regular basis. With both the increasing oil-prices and the continuing climate change debate in mind, the question about using these wood chips as a source of energy is being raised.

Based on this question a pilot study has been performed for the district of Steinfurt to investigate the possibility to use wood chips from the maintenance activities as a source of energy. As part of this investigation an ICT system called "*WallIS"* has been developed. *WallIS* is a geographical information system to store all relevant information on wooden banks. Although the amount of wooden banks is estimated as enormous in this German region, these banks belong to many owners (mostly farmers). Once collected, a system such as WallIS is potentially able to provide an overview of all these banks and how they are linked together. This is considered as crucially important because only then harvesting can be made economically viable whilst preserving ecological aspects.

4 Problem definition

From interviews with the Heckenmanagers (people responsible for the maintenance of wooden banks) from the districts of Nordhorn *(Haver, 2010)* and Steinfurt *(Brink, 2010a)* and mr. Von Gember from the *"Landesbetrieb für Wald und Holz" (2010)* between 10.000 and 15.000 kilometres of wooden banks is available in the research area. During discussions consensus was reached on a total available length of 12.000 kilometres. 10% of these wooden banks are owned by local governments, who suffer from high maintenance costs. 90% is privately owned *(von Gember, 2010)*.

The role of the WallIS –system is that it can link multiple wooden banks and by doing so these banks can be grouped into lots. These lots can be "auctioned" by the responsible Heckenmanagers to several contractors (harvesters). Only in that way, significant cost benefits can be achieved for the owners (*Wallhecken- und Holzclusterkonzept',* Kreis Steinfurt 2008, p 51). Thus, one important benefit of the system is that, when fully utilized it would contribute to make maintenance financially attractive for the many owners and at the same time help to preserve the landscape because it can be structurally organized.

However, there are already some other economic market actors active in the region. These actors operate Germany wide and have already recognized the potential of this region for providing wood chips also for biomass purposes. These actors buy the material that is provided by a few contractors who harvests wood chips in commission of private owners and "Heckenmanagers". The bulk of this material is sold against market prices and disappears to an "anonymous" market likely consisting of large scale users outside the focal region. These developments fit into the view provided by other reports who indeed suggest that biomass in general is a strongly upcoming renewable energy source in Germany. Analysts believe that Germany's renewable energy policy is an unequivocal success, a conclusion that is reached on the basis of the German government's adoption of renewable energy and enactment of far-reaching energy and environmental laws that give thrust to displacement of fossil energy systems[1]. In 2007, bioenergy meets almost five percent of Germany's primary energy demand and the German government aims to ensure that domestic biomass is sustainably produced and used. This involves providing proof that biomass crops are grown using sustainable management practices, and that biomass-derived products are produced sustainably and used efficiently[2]. This is exactly the aim of the INTERREG project and here a sustainable management practice is ensured only when all activities – from harvesting to consuming- take place within a smaller region. However, for that to happen it is important that the WallIS system becomes utilized to reach a critical mass level and that the harvested material is marketed and distributed within the same region. What now counts for the project group are the collections insights into the conditions and premises necessary to develop a regional market structure for wood chips. From this problem statement we have defined our general research question: what are the current market conditions in this region in terms of customer preferences, infrastructure and supply and - based on these insights - what are the premises to develop a regional market for renewable energy?

This research hopes to contribute to the insights and will be outlined in the following section.

[1] See, for example: Mischa Bechberger and Danyel Reiche, "Renewable Energy Policy in Germany: Pioneering and Exemplary Regulations," Energy for Sustainable Development Vol. VIII, No. 1 (March 2004), 47; Thomas B. Johansson and Wim Turkenburg, "Policies fr Renewable Energy in the European Union and Its Member states: An Overview," Energy for Sustainable Development Vol. VIII, No. 1 (March 2004), 12.

[2] „National Biomass Action Plan for Germany" Publisher Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) 11055 Berlin, Germany Internet: www.bmu.de

5 Objectives

To be able to obtain more insight in the market for wood chips - originating from maintenance activities on wooden banks – the research of this market has been split in two; separate research is done for both the supply and demand side of the market.

Regional orientation and functioning of the market based on ecological factors is unlikely. Due to the structure of the project and the importance of the ecological factor the research region is limited to five districts.

The objectives are as follows:

- *Obtain insight in the current market conditions and the expected development of the market for wood chips originating from maintenance activities on wooden banks*
- *Identify possible user groups for the usage of wood chips originating from maintenance activities on wooden banks for heating purposes*
- *Identify possible limitations in the usage of wood chips originating from maintenance activities on wooden banks*
- *Develop a possible innovation trajectory for a renewable energy market for wood chips in Germany and the Netherlands region.*

6 Research questions

- *How is the current supply structure; what are the expectations on the development of supply of wood chips originating from maintenance activities on wooden banks?*
- *Which possible user groups can be identified and which preferences do they have when using wood chips for heating purposes?*
- *What kinds of limitations impede the adoption of wood chips for heating?*
- *Which alternatives are available?*

7 Part I - Supply

7.1 Introduction

The first part of this research has its focus on the supply structure of wood chips originating from wooden banks. It is important to gain knowledge of the supply structure to discover potential strengths and or weaknesses.

The supply structure of the market is primarily defined by the different actors (Heckenmanagers, owners of wooden banks, harvesting contractors who perform the pruning activities and companies providing infrastructure facilities) involved to deliver a product or service to the customer. Besides this formal description, other elements such as the average volume, the potential fluctuations in volume, price, quality and the general availability of the product all affect the stability of the market.

In the description of the supply structure, the number of suppliers and potential problems stemming from fluctuations in supply are looked upon. Additional factors considered are the potential growth of supply and the infrastructure available for processing and storing wood chips.

First, the objectives for this part of the research are given (7.2), then the methods used to acquire the research data are discussed (7.3); from the data acquired different actors can be identified, an overview of each of them is provided (7.4) followed by a description of the complete supply process (7.5). After having identified the supply process, the available infrastructure (7.5) and quality considerations (7.6) are looked upon. This is followed by an overview of the number of suppliers (7.8), the fluctuations (7.9) and development of supply (7.10) and the regional availability of wood chips (7.11). The conclusion about the supply structure of the market is the last section of this chapter (7.12).

7.2 Objectives

The first project objective (obtain insight in the current market conditions) is applicable in this part of the research. This objective, placed into the context of the supply structure, can be redefined as: *Obtain insight in the current market conditions and the expected development of the market for wood chips originating from maintenance activities on wooden banks from the view of all actors involved in the supply of these wood chips.*

The third project objective *"Identify possible limitations in the usage of wood chips originating from maintenance activities on wooden banks"* is applicable as far as the limitations in usage originate from the technology used by harvesting contractors or where the limitations are caused by differences in the raw material.

7.3 Methodology

This research includes the actors involved in the supply chain of wood chips and the possible customers buying wood chips for heating purposes. Numerous studies for the supply of wood chips have been performed. Existing data from these studies has been verified with experts, placing emphasis on the factors affecting the economic feasibility. The actors on the supply side include the owners of the wooden banks, the "managers" of the wooden banks (Heckenmanagers), the contractors responsible for pruning and the companies providing infrastructure facilities (i.e. active drying of wood chips).

The methods used in this study are both qualitative and quantitative. To help understand the current market situation, the available infrastructure and the technology needed for heating from wood chips, qualitative methods are used. Interviews and group discussions with actors on the supply side are the main sources of qualitative data. With the qualitative techniques in-depth data of the supply structure was acquired.

The qualitative study has primarily been executed by conducting face-to-face interviews with experts; some interviews were done by phone. The interviews where partly used to complement or verify previously gathered data from literature and earlier interviews.

Most interviews were semi-structured with open questions. Interviewees could provide in-depth coverage of the subject and were allowed to deviate to other areas which they deemed relevant for the progress of the

project. In this way the advantages of depth and exploration when using semi-structured interviews *(Zwaan, 2003)* were aligned with the main goal of the research at this stage. The disadvantages posed by the time consuming nature and the limited number of interviews possible *(Zwaan, 2003*) were considered to be less relevant than the ability to obtain the needed insight in the current market conditions. However in the last few interviews, after gathering most data, the time consuming nature did become more important. Hence these interviews were mainly used to verify data acquired in an earlier stage and less leeway to deviate was given to the interviewee.

With the data gathered from literature and interviews an overview of the actors involved in the supply structure could be drafted.

Research Area	Data Gathering	
	Secondary data[3]	Primary data[4]
Current Supply	Literature	Qualitative interviews
Trends in supply	Qualitative interviews	

Table 1 - Methodology overview

7.4 Actors

The actors involved in the supply structure for wood chips can be described as the various stakeholders from both an operational perspective as well as those from a landscape management perspective. Stakeholders from the operational perspective include harvesting contractors who perform the actual harvesting activities and the companies that provide the infrastructure to process freshly harvested wood chips. The landscape management perspective includes the owners of wooden banks and the responsible managers for maintenance of the wooden banks (Heckenmanagers).

In the following sections each of the actors and its importance to the supply structure is described.

7.4.1 Heckenmanagers

Managers of the wooden banks (so called "Heckenmanagers") are responsible for the maintenance of the wooden banks in a specific district. Their primary objective is the preservation of the cultural landscape through well planned and regular maintenance of the wooden banks in their district. To achieve this, they try to establish a "*central authority"* for the management of wooden banks. The Heckenmanagers are active in this role since November 2009 *(Brink, 2010a).*

The interviews with Heckenmanagers Brink *(2010a)* en Haver *(2010)* show that centralization of the management of wooden banks implies an active acquisition policy of wooden banks. Owners of wooden banks

About 10% of all wooden banks in the research area is owned by municipalities. The remaining 90% is owned by private individuals or companies *(von Gember, 2010).* The municipalities have an existing responsibility for the management and maintenance of the wooden banks in their area. In many cases they are committed to (long term-) contracts with companies like harvesting contractors to perform these activities. Despite the potential to save costs significantly by transferring the management and responsibility of of wooden banks to the Heckenmanagers, the municipalities are unable to do so in the near future because of the existing contracts *(Brink, 2010a & Haver, 2010).*

A large part of the privately owned wooden banks is not maintained on a regular basis. It is hard to determine the exact reasons, but it can be safely assumed that these owners, the majority of which are farmers, do not

[3] Publicly available data

[4] Data gathered specifically for this research

set maintenance of the cultural landscape as their first priority. This could be due to maintenance costs and the time to be spent in maintenance activities *(von Gember, 2010 & Haver, 2010).*

7.4.2 Harvesting contractors

The harvesting contractors carry out maintenance work on various natural elements, including both work on wooden banks and forest management. The wood harvested during the maintenance activities can consist of logs and/or wood chips. In theory the wood is still owned by the owner of the natural elements, in practice the value is subtracted from the costs for the work and the harvesting contractor keeps the wood *(Brink, 2010b).*

In case of wood chips, most harvesting contractors have an existing customer base that is large enough to put pressure on them to deliver sufficient amounts. The priority for most harvesting contractors lies not in expanding the existing customer base, but in keeping current customers happy. Harvesting contractors try to minimize the cost of transportation; therefore most customers (often large scale users) are situated within a radius of 30km from the harvesting contractor *(Hahnhart, 2010 & Grevers, 2010).* However, there are also customers that reside outside the region and these customers are apparently willing to pay a surplus for quality biomass material (Ahlke, 2011).

After numerous attempts to contact several different harvesting contractors for further information the result is limited to one telephone interview with FA Grevers Bosbouw *(2010)*. Most information about the activity pattern of the harvesting contractors was obtained from interviews with the Heckenmanagers Brink *(2010a)*, Haver *(2010)* and Hahnhart *(2010)*.

7.4.3 Infrastructure Organizations

Freshly harvested and processed wood chips can have a humidity of 45% *(Sylwur, 2009).* Wood chips suitable for usage as fuel must have a moisture content below 20% *(Bakker, 2010 & Princen, 2010).* If sufficient space and time is available, wood chips can be dried passively (covered with a tarp), alternatively wood chips can be dried active by blowing hot air through a container with wood chips. Installations for active drying can greatly increase the speed at which wood chips become available.

Installations that have excess heat which isn't used directly can use this heat to dry wood chips. Biogas installations for example are primarily used to generate electric power, the residual heat can be easily used to dry wood chips *(Hanhart, 2010).*

Figure 2 - Residual heat from a biogas installation is used to dry wood chips

7.5 Process Description

According to Brink *(2010a)* and Haver *(2010)*, the acquisition process starts with the transfer of the management and responsibility of an area with wooden banks from a municipality to the Heckenmanager. This transferred area of wooden banks then serves as a starting point for further acquisition of privately owned adjoining wooden banks.

The regional bundle of adjoining wooden banks is inspected: all natural elements are categorized and specific instructions for the harvesting contractors are recorded.

A tender procedure is started to offer the bundle along with all data to different harvesting contractors. Most tenders result in 5 to 10 competing offers from harvesting contractors. The offers consist of a price for the maintenance activities less an offer for the wood harvested. The harvested materials are freely available to the harvesting contractor.

Most harvesting contractors have an existing customer base to which they deliver either freshly processed wood chips or dried "ready to use" wood chips. In the latter case the harvesting contractors uses various infrastructure organizations to dry the wood chips before delivering them.

7.6 Infrastructure

The available processing capacity needed to guarantee a regular supply of wood chips at a constant humidity and storage capacity needed for buffering are considered as the market infrastructure. During our visits to several locations with guidance of Mr. Hanhart *(2010)* it became clear that the existing infrastructure is sufficient. Especially farmers with biogas conversion plants created opportunities to actively dry wood chips. The harvesting contractors handle the storage space, of which no shortage is apparent. The infrastructure is not a limiting factor at the current volumes *(Brink, 2010a & Haver, 2010 & Princen, 2010 & Hanhart, 2010 & Grevers, 2010)* Mr. Brink has several anecdotes about the ability of harvesting contractors to react quickly to demand for wood with a lower humidity level. Mr. Princen has yet to experience the first problems to find wood chips in a sufficient volume and quality for the usage in wood chips furnaces with a maximum capacity of 150 Kw.

7.7 Quality considerations

The quality of wood chips is quite a different story. At the start of this research no formal framework existed to assess the quality. Logical elements were known, such as the humidity, the average particle size and the variance in particle size. At the meeting in Coesfeld at the 1st of December 2010 a preliminary set of quality measures was presented by a representative from the "*Internationales Institut für Wald und Holz NRW".* Beside the aforementioned elements ash-percentage and heating-value were added, as well as a description of the methods used to calculate each of these elements. A proposal for systematic analysis was also included, to enable the construction of a database with all relevant quality information of wood chips originating from different wooden banks. If implemented along the lines proposed, this will remove the quality uncertainty barrier.

With the information presented, wood chips originating from wooden banks would probably be rated at the top of category B, where A is best and C is worst. Due to the nature of the maintenance activities, the particle size variation in wood chips from wooden banks is quite high; another contributing factor is the biological diversity in the vegetation.

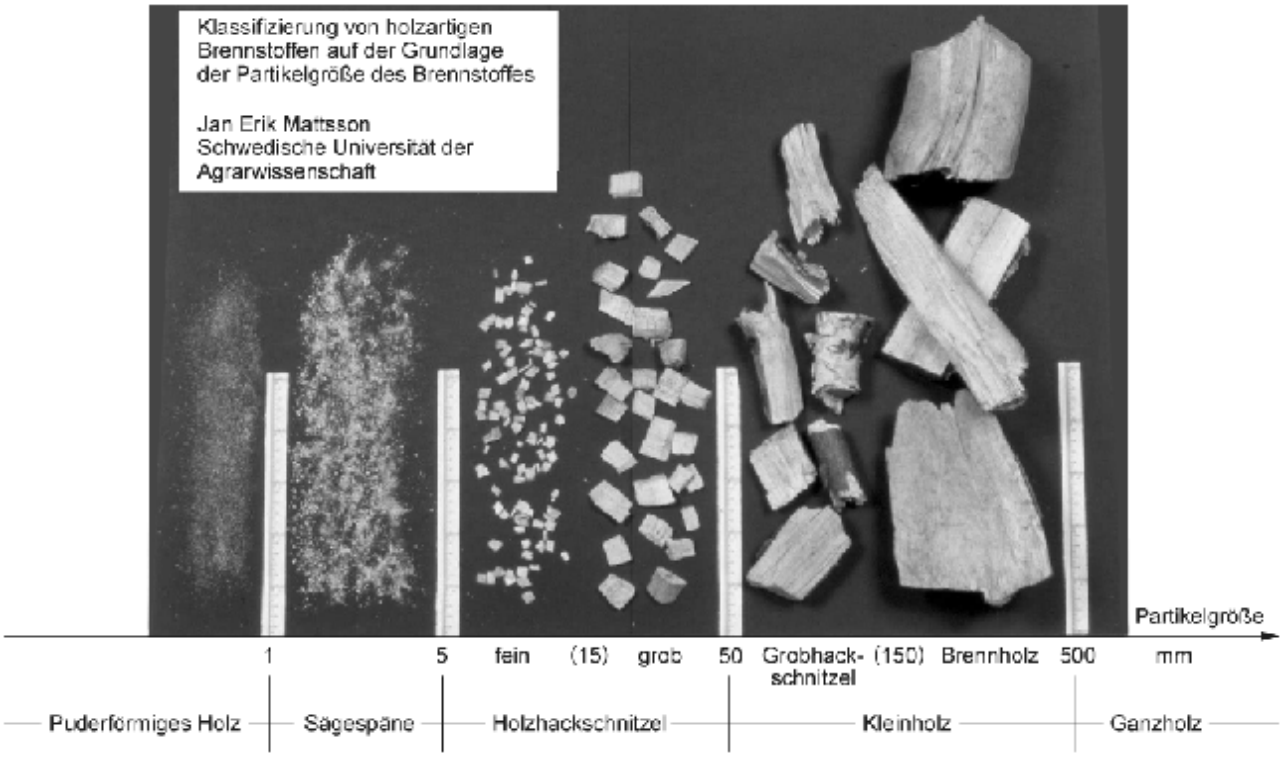

Figure 3 - Classification of wood based fuels based on particle size

7.8 Number of suppliers

Harvesting contractors carry out maintenance activities on natural elements and they have customers for the wood chips that result from these activities.

Brink (*2010a)* has an extensive list of harvesting contractors available for maintenance activities. However, most of the companies are unknown to him, since the number of tenders completed is very limited. In recent history all of these companies did participate in maintenance activities, otherwise they wouldn't have ended up on the list of the Forest Management Council.

The list has around 100 harvesting contractors on it; their activities are not limited to the Steinfurt area. The total number of active harvesting contractors in the research area is large; a complete inventory is beyond the scope of this research. A quick search on the internet yields a significant number of suppliers of wood chips, pellets and miscanthus. Several websites enable the visitor to sort by region and type of fuel. Wood chips can be obtained with ease, however the volume offered per supplier is fairly limited.

7.9 Fluctuations in supply

The stability of the market can be severely influenced by variations in volume. Variations can occur both within one year and between different years. Users of wood chips for heating purposes are probably somewhat dependent on the availability; large variations in volume will also affect the price stability.

Hoffman & Weith *(2005)* studied possible limitations and improvements in the usage of woody biomass for energy. They conclude that variations in growth rate are primarily influenced by existing growth factors; differences in climate are far less influential. Significant yearly variance in the supply calculated over a larger region is therefore unlikely.

Variance within the year is quite logical. The period in which harvesting contractors are allowed to perform maintenance activities is limited from October till February *(Brink, 2010a & Haver, 2010).* According to Hanhart *(2010)*, Brink *(2010b)* and Grevers FA Bosbouw *(2010)* harvesting contractors are capable of buffering. The necessity to buffer is limited because the period in which the activities are performed is in alignment with the period in which demand for wood chips is at its maximum. Grevers FA Bosbouw *(2010)* adds that only a

limited number of customers have year round demand. However, these customers usually have larger installations, sufficient storage space and the capability of using multiple bio-fuel sources (*Grevers, 2010 & Hanhart, 2010).* Although variances within a year do occur, these variances can be handled by the harvesting contractors.

7.10 Development of the supply

The current supply of wood chips has different sources; wooden banks are one of those. The wooden banks owned by the different municipalities are maintained, from the other 90% privately owned wooden banks a substantial although not quantifiable amount is probably not maintained on a regular basis *(von Gember,2010 & Haver, 2010).* Quantification of the other sources is outside the scope of this research.

The total amount of available wooden banks in the districts of Borken, Coesfeld, Nordhorn, Steinfurt and Warendorf and the county of Bentheim is estimated between 10.000 and 15.000 km *(Brink, 2010 & Haver, 2010 & von Gember, 2010).* The information provided from these interviews suggest an annual growth rate of 1 m^3 per 100 m^2 per year, an average width of 4 to 5 meters and a factor 2,5 for the conversion between a solid m^3 of wood and the volume of the wood chips. Based on these assumptions there is a yearly potential of 400.000 to 750.000 m^3 of solid wood, equivalent to 1.000.000 to 1.875.000 m^3 of wood chips.

In November 2009 the acquisition of wooden banks started; in July 2010 only 50km (out of a potential of 3.500km in this region; 1,4%) became available in the portfolio of the Heckenmanager in the Steinfurt district (*Brink, 2010a).* Mr. Brink expects to raise the acquisition speed significantly in the next years; the main problem perceived are the existing contracts of the municipalities which hamper the acquisition. For the district of Steinfurt a target of 500 km (14%) is set at the end of 2011.

(Brink, 2010a)

> *"Acquiring 50% of the total available potential would be a really good result; it is my personal conviction that we will not reach this number in the next decade."*

Other interviewees are not as explicit, but in general this view is shared. The maximum estimated supply of wood chips from wooden banks is therefore estimated at 500.000 to 937.500 m^3.

It is unclear how much of this potential is already being harvested outside the control of the Heckenmanagers; it is however safe to state that a substantial amount of the wooden banks acquired will add to the total supply as a substantial part of the wooden banks from private owners don't receive regular maintenance at this moment *(Haver, 2010).*

One critical remark has to be made: the current approach cannot be maintained at neutral cost. On average the value of the wood harvested has to be supplemented by €1,00 per m^2 to pay for the maintenance costs. Municipalities however pay significantly more. When their current maintenance contracts end, the costs will probably play a substantial role in the decision making process at the municipalities (*Brink, 2010a & Haver, 2010).*

7.11 Regional availability of wood

Despite earlier efforts to create insight in the amount of wood available for processing into wood chips (see reports *'Stoken op streekhout',* Sylwur team 2010 & *'Wallhecken- und Holzclusterkonzept',* Kreis Steinfurt 2008), a detailed view of the current amount of available wood to process into wood chips is not available. The percentage of wood chips originating from wooden banks cannot be estimated; even the total amount harvested from wooden banks is unknown.

According to Brink *(2010a)* and Haver *(2010)* it is likely that most of the wood chips find their origin in maintenance activities on natural elements; from roads, forests and wooden banks. A smaller amount is attributed to waste from i.e. wood processing factories.

We do know however, that most harvesting contractors face considerable difficulties to provide their existing customer base with a sufficient volume of wood chips. Not to the point that failure in deliveries occur, but to such an extent that expanding is not high on their list of priorities *(Hanhart, 2010 & Grevers, 2010).* Due to the

high costs of transport in comparison to the value of the wood chips, harvesting contractors have a geographical boundary in which they can operate on an economically viable basis *(Sylwur, 2010 & Hanhart, 2010 & Grevers, 2010)* .

7.12 Conclusions

At the start of this project the assumption was made that a market for wood chips didn't exist, or that it would function at a marginal level. After the first few interviews it was quickly discovered that this viewpoint is incorrect: a thriving market does exist and is becoming further institutionalized.

Most of the wood chips originate from maintenance activities at natural elements (wooden banks, forests & road side). The harvesting contractors who perform the maintenance activities also act as suppliers of wood chips to the end users. The market infrastructure is sufficient to enable them to deliver wood chips at a constant low humidity level - which implies that the quality is sufficient - and the storage capacity isn't a limitation either.

However, the market does not operate on well balanced ecological and economical values. In other words, the existing market tend to use biomass material from this region in a traditional way instead of a modern use *(Goldemberg & Teixeira Coelho, 2004).* It is therefore plain to see that the market does not behave according to the goals set by this project; it is however safe to state that the hard economic aspect currently dominates The sheer logistics involved in moving wood chips around does act as an ecological limit, however, also largely fueled by typical calculative economic behavior and less driven by ecological or idealistic values.

The supply of wood is stable and doesn't really depend on yearly variances in climate. The total supply can increase significantly, mostly by acquisition of privately owned (currently largely unmaintained) wooden banks. A substantial time period for this acquisition has to be allowed since the transfer of responsibility of wooden banks owned by the municipalities to the Heckenmanagers signals the start of a regional acquisition project. As argued in one of the earlier sections these municipalities have existing contracts with harvesting contractors performing the maintenance activities which delay the acquisition process. The role of the Heckenmanagers will increase as the total acquired area grows. To be able to accurately predict the development of supply additional research is required.

The harvesting contractors don't focus on expanding their customer base, according to our sources they have to focus on keeping their current customers happy. This suggests difficulties in acquiring sufficient amounts of natural elements to process. This tendency also adds to the increasing importance of the Heckenmanagers.

The efforts being made on creating a framework for quality assessment and on building a quality database will greatly improve the ability of harvesting contractors, technology suppliers and customers to communicate in an effective and efficient manner. As different quality classes of wood chips become clearly defined, the usage and therewith the exploitation of wood chips can be improved. This of course also depends on potential customer preferences and the possible uncertainties they have. This and other issues related to the demand side of the market will be addressed in the next section.

8 Part I - Demand

8.1 Introduction

The second part of the research is focused on the demand for wood chips originating from wooden banks. The demand for wood chips with respect for both ecological and economical aspects has significant influence on the feasibility of the project. Demand for wood chips from wooden banks can be influenced by numerous factors among which: the availability of technology, costs, legal issues and available alternatives.

The demand is described by providing information about possible limitations that impede adoption (8.4), legal issues (8.5), alternative energy sources (8.6) and the development of demand (8.7). In section 8.8 the selection of the target groups is discussed. This chapter is concluded by the results of a survey with closed questions distributed among several potential user groups containing questions about the current heating system(s) in use, the importance of financial indicators and their attitude towards the usage of wood chips for heating purposes (8.9).

8.2 Objectives

In this part of the research two objectives are relevant: the identification of possible limitations that could impede the adoption of wood chips for heating and the identification of possible user groups.

If limitations are present, the feasibility of the project could be jeopardized. The impact of these limitations should be assessed.

Besides identifying potential user groups, their ability and willingness to adopt a heating system using wood chips has to be investigated to make sound judgments about the demand.

8.3 Methodology

The data needed for this part of the research has been gathered by using both qualitative and quantitative methods. As was the case with the first part of the research, desk research provided a basis with which interviews, group discussions and ultimately the survey were structured.

In contrast to the interviews used to obtain information about the supply structure, most interviews for this research part were structured interviews. The majority of which were done by phone. As Zwaan *(2003)* points out, this has several advantages such as a better focus on the subject at hand and the less time consuming nature. Some disadvantages are also present; the setting is less naturalistic - which might prevent the interviewee from answering according to their real thoughts – and there is less room for open ended answers. Since the issues that were looked upon in these interviews were well defined, structured interviews were an appropriate method. These interviews were used to obtain information about possible limitations and different alternatives to wood chips.

To define the potential user groups, different group discussions and projective techniques were used. In these group discussions, participants first tried to find consensus about the different factors to be used in the segmentation process. With this information several user groups could be described. Finally the user groups to be included in the survey were selected.

The quantitative approach is used to gather information about the attitudes of different target groups. The study was conducted through a survey using closed likert scale based questions. The variables chosen all contribute to one of three topics of interest: (a) economic aspects of using wood chips as an energy source, (b) the logistics involved in using wood chips as an energy source, and (c) the attitude towards the usage of a renewable energy source. The resulting survey has been distributed to 480 agricultural firms and public institutes in the research area by the postal system.

The disadvantage of the written questionnaire with closed questions is the lack of depth in the response; in addition there may be a positive or a negative selection of respondents. The main advantage is that in this way a large amount of data can be collected within a short time *(Zwaan, 2003).* The focus of the study among the target groups is to measure the attitudes of known variables, so the lack of depth is not important.

The response rate of the questionnaire was low at 9,6% (46 respondents). Hence the statistical significance is limited because of the low response, the high probability on response-bias, and a number of incomplete questionnaires. Response-bias is likely, since 15% of the respondents use wood chips as an energy source, interviews suggest that 2% would be the regular amount in the German population.

Research Area	Data Gathering	
	Secondary data[5]	Primary data[6]
Limitations in adoption	Literature	Qualitative interviews
Grants & Legal support	Literature	
Available alternatives	Literature	Qualitative interviews
Distinction in target groups	Literature	Group discussions
Attitudes of target groups	Quantitative survey with closed questions and qualitative exploration	

Table 2 - Methodology overview

8.4 Limitations in adoption

The adoption of wood chips as an energy source for heating might be inhibited by several factors; the technology might be too costly or the cost, quality and availability of the wood chips itself can be unsatisfactory. The supply of wood chips has been discussed in the previous chapter; in the following paragraph other potential limitations are discussed.

8.4.1 Available technology

The usage of any fuel to provide heat requires safe and reliable technology. This technology also has to be affordable. Using wood (in many forms) as an energy source is not new. In Sweden and Austria wood pellet based systems are widely adopted *(Fiedler, 2004).* Interviews with suppliers indicate that the technological differences between boilers using wood chips, wood pellets or blocks of wood are limited to the supply system. Most recent systems are capable of burning a large variety of bio-fuels if the particle size is within a certain range. In practice miscanthus, wood chips and pellets are interchangeable. A large number of suppliers sell these systems, availability is not a problem *(Princen, 2010 & Bakker, 2010)*.

Figure 4 - Boiler with an integrated fuel store

[5] Publicly available data

[6] Data gathered specifically for this research

8.4.2 Market Segmentation by heating capacity

Interviews with Mr. Princen *(2010)* and Mr. Bakker *(2010)* revealed that installations with a capacity larger than 150Kwh are mostly customized installations. Anything between 50Kwh and 150Kwh is available "off the shelf" and is seen as a small installation. About 90% of the current market falls into this last category.

The most interesting market segment is found at the top of the non-customized spectrum, this is influenced by several factors. The most important being that larger (>75 Kwh) installations are less susceptible to fluctuations in the quality of the fuel. Another factor is the competition from natural gas and the abundant supply of relatively cost attractive installations burning natural gas. This factor is far less important in Germany in comparison to the Netherlands *(Princen, 2010).*

The lower end of the spectrum is far less interesting. Both installation costs and operational costs are relatively high *(Bakker, 2010).*

8.4.3 Quality and Cost aspects

The suppliers are keen to point out that wood pellets have higher energy content by volume, lower ash residue, better quality standards and stable prices when compared to wood chips. The operational costs are influenced most by poor quality control of wood chips leading to uncertainty of energy contents and additional logistical costs. For smaller installations wood pellets are more interesting. According to both suppliers, there has not been any shortage of supply in their projects. The quality however is often not guaranteed, which causes some concerns *(Princen, 2010 & Bakker, 2010).*

8.4.4 Legal limitations

All fuel burning systems have to adhere to EU and local emission norms. No other limitations - that differ from regular heating system regulations - are present *(Bakker, 2010, Brink, 2010a, Hanhart, 2010, Princen, 2010).*

8.5 Grants and Legal support

Although it is generally accepted that the supply of fossil fuels is limited and that oil prices will continue to rise, using alternatives is not that natural.

The price development of fossil fuels has positive effects on the affordability of the different alternatives. To stimulate the usage of these alternatives grants are still necessary *(Lauber & Mez, 2004 & Negro & Hekkert, 2008).*

8.5.1 Existing subsidy systems

Lauber & Mez *(2004)* did research for the effectiveness of 30 years of energy supply based subsidy in Germany. Among their conclusions they state that the market development subsidy's introduced in 1988 were of great importance. Germany has set itself a general accepted goal for 2050 to have 50% of total energy consumed to be produced by renewables. To help attain this goal the "*Erneuerbare-Energien-Wärmegesetz" (EEWärmeG)* legislation came into force on the 1st of January 2009. It concerns legislation on *"Bundes"* level which amends the *"Integrierten Energie- und Klimaprogramms" (IEKP)* that was approved by the German government on the 5th of December 2007. EEWärmeG concerns the usage of biological fuels for heating purposes. New buildings with a floor area over 50 m^2 face demanding requirements on the share of renewables in total energy consumption. According to several people in the discussion of the 23rd of September 2010 in Steinfurt, the main problem with this legislation is the loose definition of renewables.

Part of the EEWärmeG is a market development subsidy aimed at supporting installation of biological fuel burning installations. The first 4 months of 2010 saw 82.000 applications for a total of €265 million. On March the 3rd the subsidy program has been frozen due to overwhelming success; on the 12th of June new requests were accepted for a maximum of €115 million *(Bafa.de, 2010).*

8.6 Alternative energy sources

The aim of this project is to use wood chips for heating purposes. For this reason alternatives aimed at generating electricity are not included in this overview.

8.6.1 Fossil Fuels

Two regularly used fuels for heating are gas (LPG or natural gas) and heating oil. Prices for both types are directly linked to the price development of crude oil. Price development of gas is actually more volatile than the oil price itself, an increase of the crude oil price leads to a larger increase in the price of gas. This development is not symmetrical, if the oil price drops, the price of gas does drop, but not as quickly *(Borenstein, Cameron & Gilbert, 1997).*

As illustrated in the figure on the right, the general tendency is that world oil prices will increase steadily, whether slow or fast. Economic growth is an important indicator as is the stability of the regimes in the Middle-East.

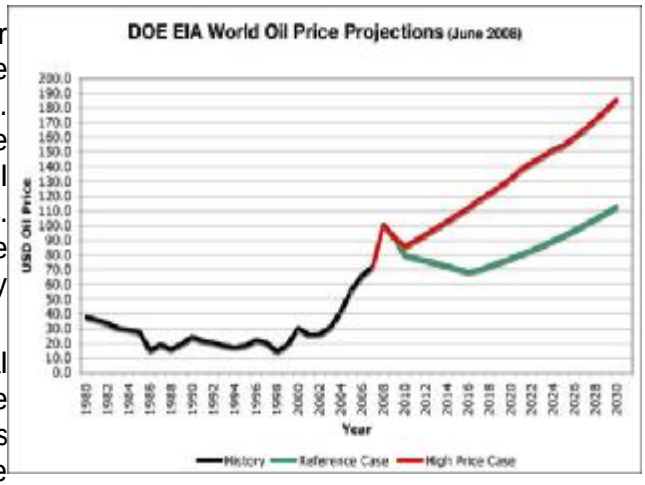

Figure 5 - Oil price expectations - Richard Shaw

8.6.2 Other bio fuels

Competition for wood chips also comes in the form of wood pellets, different kinds of biological waste (flax or cocoa shells) or plants grown specifically for this purpose (i.e. miscanthus).

8.6.2.1 Pellets

To make pellets the humidity of the wood has to be below 5%. To attain this hu necessary. Production of pellets uses between 3% and 20% of the total energy re product *(Krapf, 1999).* Pellets are a reliable source of energy and the quality is st burning wood pellets are widely available and are very efficient *(Fiedler, 2004).* the energy efficiency of the total production process.

Figure 6 - Wood pellets

8.6.2.2 Plant material

Growing plants like miscanthus can be done on a large scale. Harvesting these plants can be done with equipment available to most farmers. Growing requires little attention and harvest is cheap. Miscanthus doesn't have to be dried since the humidity after harvest is below 15% and can be stored without risk of scalding.

Nor natural growth conditions or laws and regulations form limitations for growing plants to be used as fuel *(Hoffman & Weith, 2005).* No technological limitations exist either; most boilers capable of burning wood pellets will also run well on miscanthus *(Bakker, 2010 & Princen, 2010).*

The only real drawback to growing plants to be used as fuel is the competition for the land available to grow food.

Figure 7 - Miscanthus being harvested (left); Dried Miscanthus (right)

8.7 Development of demand for wood chips

In the past years the demand for wood chips has steadily increased. This is also reflected in the price development. The prices for all energy sources increase between 2004 and 2008, oil based fuels prices increased more *(Bröckling & Lischewski 2008, p17).* The price difference between oil-based fuels and wood chips is important for the development of demand. The difference has to be around € 0,05 per Kwh for wood chips to be interesting (which is co-dependant on quality levels and capacity of the installation) *('t Onderholt, discussion group 4th of november 2010).* At this moment the price difference is approximately at this level.

In the group discussion *(23rd of September 2010, Steinfurt)* following the presentation of the market study results several Heckenmanagers made remarks about the growing demand. Several heavy users are present in close proximity to the German research area, one was named explicitly: Emsflower. This company uses an enormous 600.000 m^3 of wood chips yearly. The demand is certainly influenced by these heavy users. At different tenders these heavy users make offers which are substantially higher (up to €4 to €5 euro per m^3 against an average of just below €0 per m^3), however they often don't qualify on the regional limitations *(Brink, 2010a).*

It is expected that the price of wood chips will rise, but it's likely the oil prices will rise much more. The price increase for wood chips does have a natural ceiling, at a certain price level transportation costs will be less of an inhibiting factor and wood chips from Russia, Poland or southern Germany will be available at competitive prices.

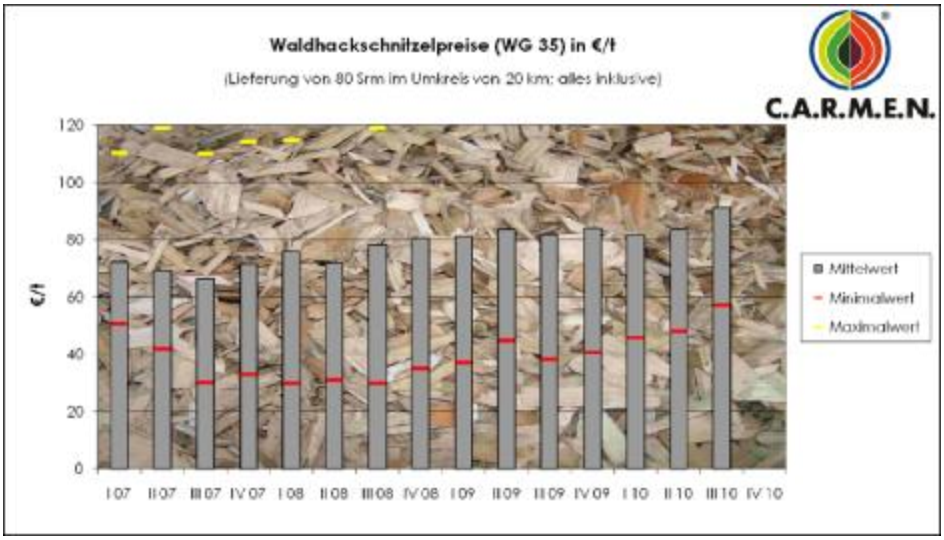

Figure 8 - Price development of wood chips with a 35% humidity *(C.A.R.M.E.N)*

8.8 Target group differentiation

Based on the study results of sylwur (2010) and several group discussions at 't Onderholt *(discussion groups 17th august 2010 & 23rd September 2010)* some key elements were identified. In no particular order these were: the availability of storage space, continuous heat requirements, perceived importance of being self-supporting with regard to heating, relative proximity to wooden banks and a positive attitude towards ecological and regional goals.

The groups were further differentiated based on technological characteristics. The interviewed suppliers *(Bakker, 2010 & Princen, 2010)* agree that 150 Kwh installations form the upper limit. Standard installations for this power output are widely available; above this limit custom installations are more likely. The bottom limit has been put on 30 Kwh. The technology suppliers *(Bakker, 2010 & Princen, 2010)* doubt the economic viability of these installations, but these doubts are primarily motivated by the Dutch situation (availability of natural gas).

The availability of storage space is a key requirement; otherwise the logistics could soon stand in the way of decent operation. This requirement quickly reduced the potential user groups; industrial firms, farmers and some public facilities qualify. The industrial firms were dropped quickly in the discussions *('t Onderholt, discussion group 17th august 2010)*: serious doubts were raised upon the regional and ecological attitude of these firms and their heating requirements (likely to be much higher if used for process heat).

The decision was made to include a variety of agricultural firms and some public facilities in the survey.

8.8.1 Survey results

The survey was distributed to 480 participants, 440 farmers and 40 public facilities. A total of 46 surveys were returned (9,6%), 34 from farmers and 12 from public facilities. Some remarks have to be made: 7 surveys were incomplete, there is a high risk of a positive response bias and due to the limited response it is not possible to draw statistically significant conclusions.

In the next paragraph the computed results from the survey will be discussed. Due to the limited significance no cross tabulations could be made; only relevant frequency tables are included.

8.8.2 Agricultural business sector

The business sector the respondents are active in. Some are active in multiple sectors.

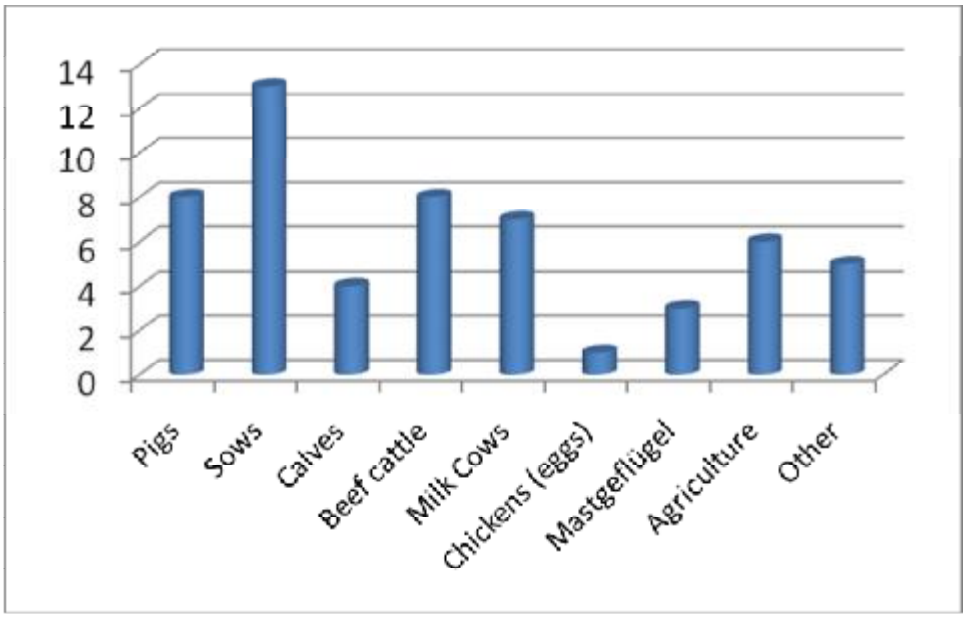

Figure 9 - Agricultural business sectors

8.8.3 Current heating systems in use

The distribution of the current heating systems among the respondents is an important indicator for the response bias, 12,8% of systems using wood chips is very high and suggests a biased response; 2% is considered the average *(Brink, 2010a & Hanhart, 2010)*. Some respondents use multiple systems.

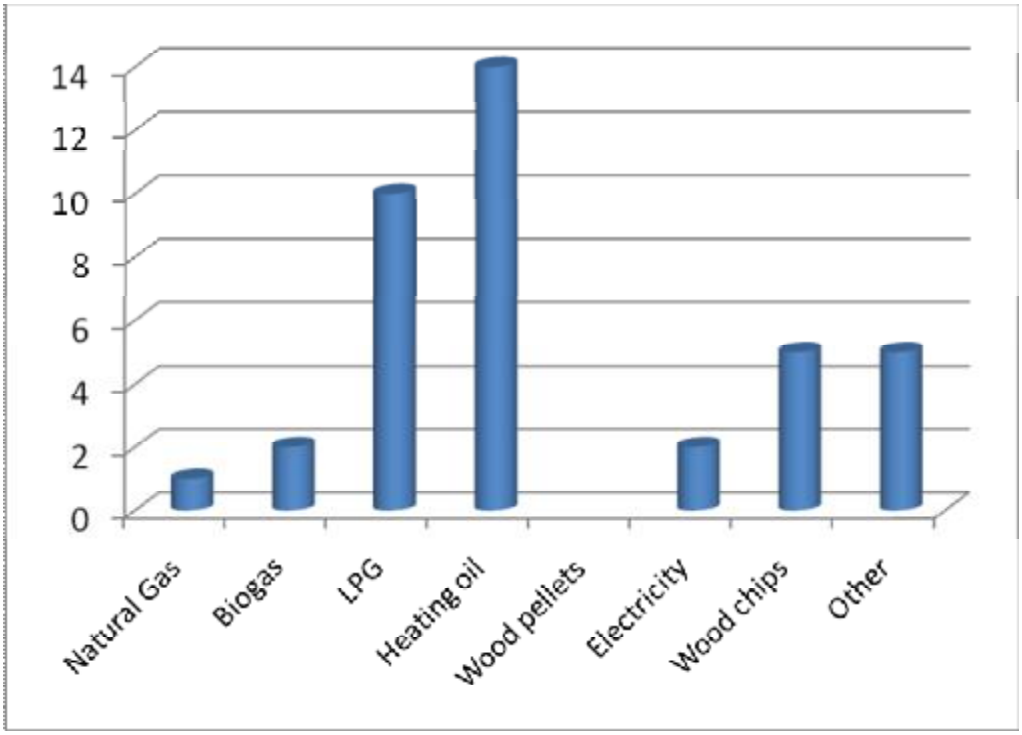

Figure 10 - Current energy source

8.8.4 Importance of financial indicators

Several questions were asked to help identify the importance of several indicators to decision making. As expected, the majority of respondents believe that the operational costs of heating based on wood chips should be lower than their current operational costs. Maintenance cost however can be higher.

The preferred depreciation period of most respondents is between 4 to 9 years, with 50% of the respondents choosing for a depreciation period of 7 to 9 years.

8.8.5 Attitude towards the usage of wood chips for heating

Judging from the data it seems likely that the attitudes towards the usage of wood chips for heating are slightly positive. It is important however to note that the ecological point of view is unlikely to dominate the investment decision. This is consistent with our earlier statement during research of the supply side.

As Mr Princen *(Kara Energy Systems, 2010)* points out:

> *"The environmental aspects of wood chip boilers are nice, but I have yet to meet the first customer that does not take the financial considerations of installation and operation first. If the economical consideration is positive, the ecological benefits can be good for PR."*

8.8.6 Possibilities of adoption of wood chips

Most respondents (about 2/3rd) indicate that they will choose a system with the same energy source as they currently have when they have to replace their current installation, which does not differ between users with traditional or renewable energy sources. The remainder all consider wood chips (among other sources) as a potential energy source for their new or replacement installation. It should be taken into account that wood chips installations are not interesting for all applications. Only those farmers who have a relative constant need for heating, will find the usage of wood chips economically viable.

9 Part I - Conclusions

There are theoretically no real limitations for the adoption of wood chips as an energy source for heating. The only cause for concern is the lack of a solid quality system for wood chips. The technology used is stable and there are many different suppliers. The suppliers do have some doubts about the economic feasibility of smaller installations.

Some legislation is available which might help the adoption of renewable energy systems in general. Because of the loose definition of what renewable sources of energy are, the real impact of subsidies for the adoption of wood chips might be somewhat limited. The available grants can be used for wood chips installations, the total number of different installations of renewable sources of energy eligible for these grants is quite large however.

Although the long-term availability of fossil fuels and the price increase are widely recognized and acknowledged, these energy sources are still the most prevailing and accessible sources of energy. Data from the survey does provide some hope, since it acknowledges the acceptance of biological alternatives. Between the different alternatives wood chips score well on both price and total ecological impact. However, the lack of quality indicators is an important issue though. Furthermore, the real competition is not between wood chips and alternative biological fuels (i.e. miscanthus or pellets), but with the existing traditional energy sources.

The survey data suggest that economical motives are most important when a choice for an energy source has to be made. The customers are willing to accept higher maintenance costs on the condition that operational costs are significantly lower. The total cost of ownership is what really matters. Wood chips are certainly on the shortlist of energy sources for new installations as they form an accepted alternative.

According to the forecasts on price development of oil, wood chips will soon be an economically interesting alternative. The German government has set a challenging goal and created a successful system of subsidies. Within this system and with the known limitations in available volume of wood chips problems with demand shouldn't occur. With prices for wood chips rising costs for the owners of wooden banks should be lower, a profitable exploitation of the wooden banks might be attainable in the near future. This does however depends on achieving a critical mass of acquired wooden banks for which the successful usage of the WallIS system is required.

The quality assurance of wood chips is not resolved yet, but important steps have been taken that suggest a transparent quality system which will benefit customers, harvesting contractors and technology suppliers.

10 Part II – The innovation journey

Commercializing with target customers and cooperative partners

10.1 Introduction

The previous market study clearly demonstrates that both geographical areas in Germany and the Netherlands differ in terms of actor characteristics, renewable energy policy, supporting institutional structure and market infrastructure. It seems that in Germany there is already a rather stabilized market for heating on wooden chip harvested from banks. At least, wood chips are harvested from wooden banks in the Münsterland area, but distributed to high volume customers outside this region. However, this material is not distributed to users in the underlying geographical area. One example is Emsflower, which is a large modern garden center in the Emsland region with an annual consumption of 60.000 m3 wood chips. Some institutionalized features of an existing and free market are already in place and a sense of awareness of the existence and application of wood chips for immediate heating technology is shared among several actors. This might be beneficial for marketers for local harvesting, distribution and consumption – the purpose of this project. We will specify these actors more in detail elsewhere.

In the Netherlands on the other hand, the reports reveals consensus between suppliers of heating systems, current users and municipalities *(Boosten & Oldenburger, 2010)* about the current states of the market. In our opinion it is very difficult to depict an existing market, because of the weak infrastructure, low number of customers and suppliers, the volatile price, quality uncertainty, and therefore a low level of institutionalization. In conclusion, the Dutch market seems much less stabilized when compared to the German market. More specifically, there is a small market in the Netherlands for this purpose, but this is restricted to some local consumers who negotiate prices and supply with owners of wooden banks themselves. Some of these installations were (partly) financed by governmental subsidies.

The government policies regarding the encouragement of environmentally friendly and alternative energy sources also differ. The German authorities seem to offer a more solid and encouraging long lasting subsidy program for alternative and environmentally friendly energy sources as opposed to the Dutch policy makers. The program seems to be solid because the policy in itself does not change much and is long lasting because they involve a long term commitment to the policy. This aspect is important for development of a renewable energy market *(Jacobsson & Johnson, 2000).* This enables market actors like technology developers in heating, owners and exploiters of wooden banks, harvest contractors, including potential users to calculate and anticipate better on what alternative energy sources can do for them.

Despite the challenging ambitions of the Dutch policy makers regarding growth of sustainable energy sources - like the one derived from biomass -their supportive role at the level of local authorities seems to be questioned *(Boosten & Oldenburger, 2010)* because there agenda construction, so far, seems only to reflect the macro ambitions. From document studies and the discussion we had, it seems that local authorities in the Netherlands are therefore not fully aware of the new technology and low emission rates of biomass energy, let alone an understanding of how to develop solid longer terms programs for encouraging local entrepreneurial initiatives to develop a market.

The remainder of this part is structured as follows. We first spend a few words on the objectives (10.2) and methods (10.3). This is followed by a review of marketing literature (10.4), followed by a short review of the available data (10.5). In section 10.6 we continue by presenting our theoretical framework and the application thereof (10.7). The conclusions (Chapter 11) form the last section.

10.2 Objectives

This part of the report is concerned with the development of a possible innovation trajectory, that is, setting out a possible agenda to further develop for a renewable energy market for wood chips in the German and Dutch regions. The innovation trajectory will be formulated using a theoretical framework and existing data on

the market environment. The framework will be applied to outline a separate innovation trajectory for the German and Dutch regions.

10.3 Methods

The information needed for the development of the innovation trajectory was primarily based on our findings in the first part of this report and additional desk and field research. Scientific papers were used to develop a framework. During intermediate presentations in Germany and a workshop in the Netherlands, we already demonstrated how such a framework can come into play once actively applied in the market.

10.4 Theoretical Background

Why an innovation journey? The reason is that recently there is much debate about the usefulness of marketing literature for practitioners. Central in this debate is the question whether marketing planning is a straight forward linear process or a nonlinear and interactive process, indeed, a journey. Proponents of the first kind suggest that proper marketing suggest a thorough marketing and market research to understand target customers need which functions as processes of segmentation, targeting and positioning relying on a proper marketing mix and plans to be executed (Booms & Bitner, 1981; Kotler, 1972, 1991; McCarthy, 1960). This approach seems to embrace the rational-comprehensive (root) perspective on policy making already addressed by Lindblom (1959) in which the ends (what we want to achieve) are isolated followed by the search for means to achieve that goal. Proponents of the second kind suggest that marketing and the development of economic markets is a highly iterative and nonlinear (e.g. Sarasvathy, 2001). Such an approach embraces the successive limited comparisons (branch) method as suggested by Lindblom (1959) in which ends and means are not considered as distinctive (see also Weick, 1979), but can are relationally intertwined with each other and shape each other's outcomes. In practical terms, marketing within this strand emphasizes the iterative nature of how ideas, products and services emerge and become valuable in the market space as opposed to the linear views on marketing. Another difference is that the first view considers desired outcomes as results from competitive strategies and collusion (e.g. Porter, 1980) whereas the second approach emphasizes that making and re-making of markets are outcomes of engaging alliances and other collaborative strategies and co-creation of value *(Garud & Karnøe, 2003; Sarasvathy, 2001; Vargo & Lusch, 2004).* The second approach takes also into account the uncertain nature of innovations (such as market development for new renewable energy applications). Moreover, some have convincible demonstrated that developing markets in the renewable energy sector (windmills) involves iterative cycles, set-backs and detours instead of progressively linear planning of scenarios *(Garud & Karnøe, 2003).* Such an approach also accounts for the nature of emerging markets *(Möller, 2010; Möller & Svahn, 2009)* which are often the result of successful enrolment of other actors and establishing obligatory passage points *(Callon, 1986)*, and mobilization of resources such as properties, knowledge and institutionalization of norms and standards *(Garud & Karnøe, 2001; Karnøe et al., 1999)*

We believe that the second approach provides us a more realistic foothold and practical guidelines in "journey like" processes responsible for the development of value propositions in markets. In drawing from this approach, it becomes important to take account what values mean and more importantly, who is valuing the proposition and for what reason? Therefore, we might analyze and develop identities for all actors, *inter alia,* governmental agency, users, wooden banks owners, harvesting contractors, etc. at both regions and uncover their interests in participating in the marketing program that we attempt to define below.

10.5 Data review and key problems

The innovation journey is based on both a theoretical framework and existing data. Data from the market research conducted in Germany has been presented earlier. Market research in the Netherlands was performed by Wageningen University *(Schrijver & Oosterkamp, 2010)* and has been different in its setup and data construction; therefore not all data acquired can be compared. Nevertheless, to makes sense for comparison, a subset with the main characteristics derived from these different data sources is presented below.

	Achterhoek/Netherlands	Münsterland /Germany
Supply wood chips investigated regions	+/- 23.000 m3	+/- 600.000 m3
Key actors	ANV	Heckenmanagers & Harvesting contractors
Legislation	Uncertain status, complex and time consuming application process for permits. Inconsistent policy programs.	No limitations. German government has delegated renewable energy programs to municipalities.
Target group/users	Agricultural firms and governmental organizations requiring constant heat.	Agricultural firms and governmental organizations requiring constant heat
Target group attitude towards wood chips as alternative energy source	Slightly negative, wood chips are an unknown source of energy and natural gas for heating is completely institutionalized.	Slightly positive, wood chips are not considered mainstream, but certainly form an alternative.
Technology concerns	None, technology is stabilized and approved. Dutch organizations even export technology to Germany and Sweden.	None, technology is stabilized and approved.
Grants	Investment subsidy limited to a certain total amount up front. Duration of subsidy period is inconsistent.	Output subsidy guaranteed for the standard depreciation term of the installation involved
Government Policy	No long term commitment.	Long term commitment to renewable energy programs.
Costs & Pricing	Wood chips prices increase, but not as fast as the price increase of fossil fuels. Harvesting costs are above the current “market price” of wood chips.	Wood chips prices increase, but not as fast as the price increase of fossil fuels. Harvesting costs are above the current “market price” of wood chips.
Perceived uncertainty	Very high; time consuming permit application and limited number of suppliers	Low

From the table with the key data above an overview of the key problems can be constructed. As concluded before, for the German regions, an existing market for wood chips exists. The main problems that interfere with the realization of the project goals are the existing market for wood chips based on economic aspects, and the ownership of the wood chips by the harvesting contractors. In the Dutch region the main problem is the uncertainty between all actors.

10.6 Theoretical framework

As described in the paragraph 10.4 marketing literature provides two approaches. In short; one approach emphasizes a straight forward linear approach *(Booms & Bitner, 1981; Kotler, 1972, 1991; McCarthy, 1960)* and oneplaces emphasis on a nonlinear and iterative approach *(Sarasvathy, 2001; Lindblom, 1959; Weick, 1979; Garud & Karnøe, 2003; Vargo & Lusch, 2004)*.

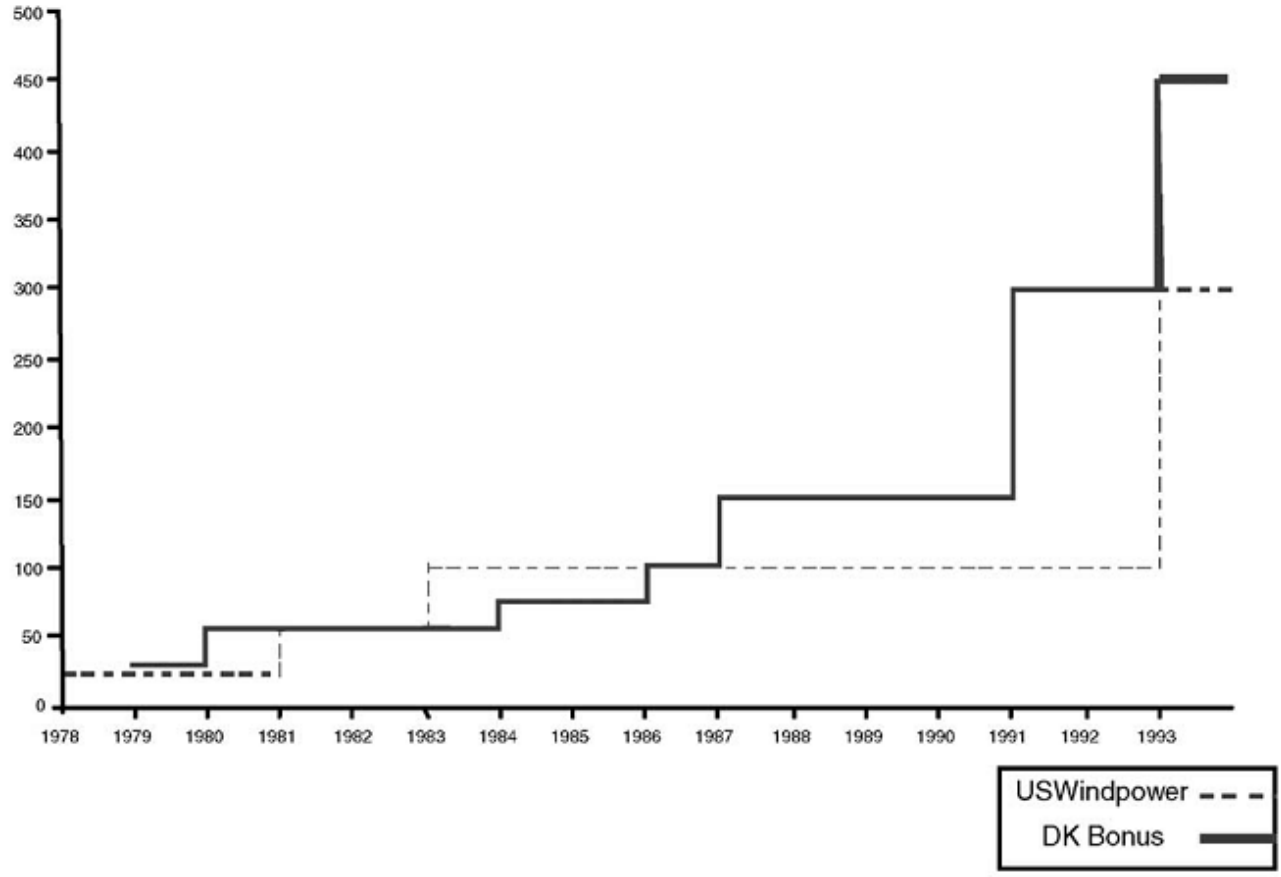

Figure 11 - Scale up steps with break-through innovation (DK Bonus) vs. linear innovation (USWindpower) As this chart shows, Bonus went through many more steps as compared to USWindpower. Moreover, Bonus had on-going product development in between steps as compared to USWindpower that did not. *(Garud & Karnøe, 2003, 286)*

Based on our research we conclude that the current market situation is unsuitable for the application of the theory of the first kind. In the Netherlands this case is very clear; the product is not defined, prices are very uncertain or cannot even be established and a logistical system is absent. At first glance the German market seems to provide options for the application of the first kind of theory. However to attain the project goals product differentiation should occur based on lower quality and higher prices than the current market standard. Hence we choose to apply and extend Möller's *(2010)* framework of sense-making and agenda construction.

Möller *(2010)* distinguishes three phases in the emergence of markets which occur iteratively and non-linear. These phases are *"Exploring for future business", "Design & Application competition" and "Mobilisation for Dissemination"*. In the article most attention is given on the exploration of future business in which sense-making *("how actors frame emerging business fields" Möller, 2010, p364)* is the most essential process.

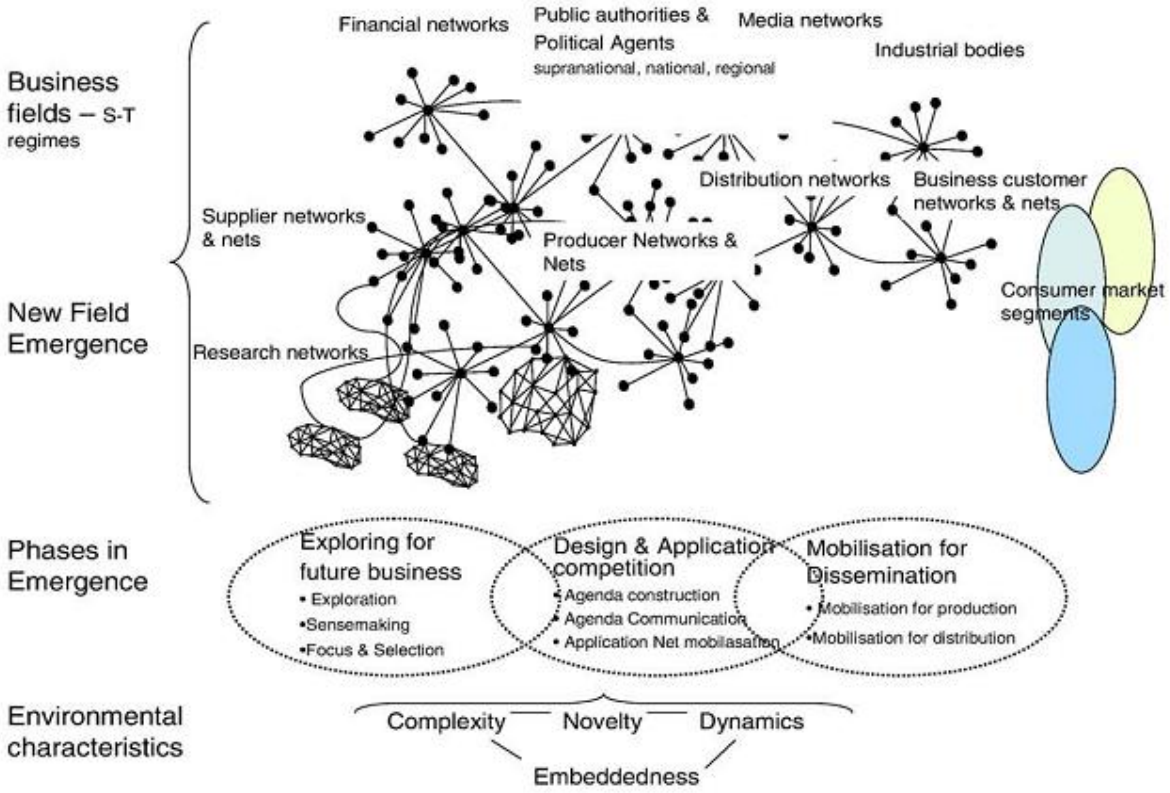

Figure 12 - Business Emergence Networks *(Möller, 2010, p363)*

Sense-making, and focus & selection are the primary tasks within the phase of exploring for future business. Sense-making is understood as the way in which actors frame reality and give meaning to it, by their perception and interpretation in order to find coherence *(Möller, 2010, p364)*. The sense-making ability provides a company with the opportunity to develop a network theory of an emerging business field and allows the identification of strategic alternatives *(Möller, 2010, p367)*. Focus and selection are those activities concerned with the identification of the appropriate alternative; to focus on and select a direction to pursue. These processes ultimately create the agenda.

The first phase leads to the design and application completion phase which in turn leads to the phase of mobilisation of resources. The mobilisation of resources inevitably leads to the incorporation of new actors, new views and new idea's which influences the agenda construction; this influence is reciprocal.

We seek to extend or alter the model of Möller by suggesting that the phase of design & application competition should be merged with the phase of mobilisation. In this way the aggregated second phase would include all processes that contribute to the reduction of uncertainty in the development of new business, and normalizing practices *(Kjellberg and Helgesson, 2007)* as a first step to institutionalisation *(vd Ven, 1999)*. The process of agenda construction however, fits within the first phase of sense-making since this can only be conceived as an outcome of sense making

While sense-making and mobilization of resources are recurrent processes, such can only take place once actors become involved into the network. Therefore, we add a third phase to the first two phases in order to emphasize its importance in stabilizing networks. Beside enrolment of new actors, we also like to emphasize the point that sometimes identities of existing actors need to be reconfigured or devaluated during the innovation journey that ideally, leads to further stabilization of a market. For that, we also pose the notion of counter enrolment[7]. Enrolment and counter influences both other phases; this influence is reciprocal. The complete process starts with sense-making & agenda construction which is followed by the mobilisation of resources and institutionalization. The enrolment and counter enrolment of actors influences both other

[7] Ian Greener (2006): Nick Leeson and the Collapse of Barings Bank

phases, through the enrolment process the sense-making and agenda construction can be altered and so on. The model suggests a continuous iteration through all phases.

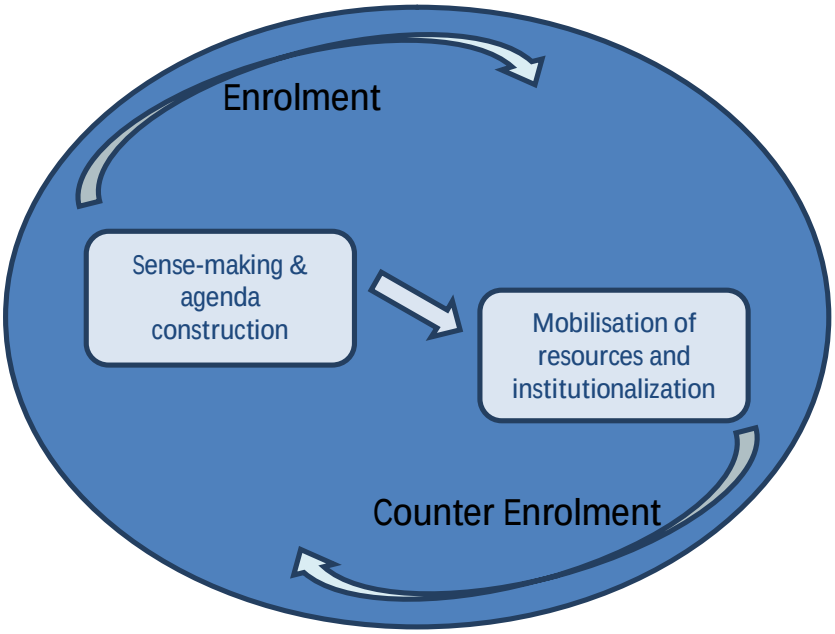

Figure 13 - Adapted framework

10.7 Theory application

In the table below the most important activities that need to be considered in the different phases provided by our framework are described for both the Dutch and German regions. In the concluding section, we recommend actions based on a further elucidation on these activities and how they can be concretely followed up.

	Germany	The Netherlands
Sense-Making and agenda construction	Emphasize the ecological goals and the need to control the flow of wood chips outside the current market Emphasize the need for scale and the participation of owners of wooden banks (Wall-IS)	Consider role of ANV's in the emerging infrastructure Consider the potential regional volume
Mobilisation of resources and institutionalization	Place control over the flow of wood chips at the Heckenmanager Stabilize material quality	Get involvement of governmental bodies, technology suppliers, potential customers to start the reduction of uncertainty Stabilize material quality
Enrolment and counter enrolment	Re-enrol all actors within their new roles (customers, harvesting contractors, heckenmanagers, owners of wooden banks)	Enroll governmental bodies, partners in logistics, potential customers and the ANV in a constraining network

Table 3 - Most important activities to complete the innovation journey

11 Part II - Conclusions & Recommendations

In the Dutch market a new network of actors can be built to enable a service provision to the customer. With the actors in this network the uncertainty for all actors (including the customer) can be greatly reduced, which will aid the adoption of wood chips for heating. Involvement of local governmental bodies is crucial since most uncertainty is with the inconsistent application of legislation. A hands-on approach is required to incorporate all other necessary actors, which is also assumed by our conceptual framework.

However, the low supply volume directly affects the total number of customers that can be serviced from the current source. Just a handful of customers are enough to consume the yearly supply. If the uncertainty can be reduced sufficiently, it might be interesting to look at other sources of wood chips. Only one part of the ANV role (the role of supplier) will shift, all other actors will remain the same.

Although the usage of wood chips is economically feasible for the end-user, the prices for wood chips themselves are too low. The ANV's depend on government subsidies to perform the maintenance operations, at this moment it wouldn't be economically feasible to keep performing maintenance work without the subsidies. The expected price increase of wood chips does have a positive impact, although the price development in the Netherlands is behind that of Germany *(Schrijver & Oosterkamp, 2010).*

In the German region the role of the Heckenmanagers is crucial to the future of this project. Because demand exceeds supply, the market forces will not take regional and ecological perspectives into account automatically. The Heckenmanager must gain control and coordination over the flow of wood chips. When the acquisition of wooden banks is successful, the Heckenmanagers will automatically get a more important role in the flow of wood chips. With this position they should be able to set the operating standards and enforce a regional approach in the usage of wood chips.

At this moment the usage of wood chips as a renewable regional source of energy is not economically feasible for all actors involved. With the expected price development this can change in the near future if sufficient scale is achieved.

In summary, the German innovation journey should ideally lead to the establishment of a new market segment with supporting infrastructure. Because an existing market is present in which economic aspects dominate and product differentiation is unlikely to succeed (higher price and lower quality) a different approach should be applied by multiple actors. The control or coordination of the wood chips for this project should be, based on our analysis, the responsibility of the Heckenmanager. In that way the destination and usage of the wood chips can be controlled and coordinated, and the project goals can be attained. However, a sufficient scale has to be attained for this project to be cost efficient. We estimate that the usage of the Wall-IS system is essential to accommodate successful acquisition of wooden banks which is necessary to create this scale.

The Dutch innovation journey is primarily involved in the reduction of uncertainty and increase awareness amongst potential customers and governmental bodies in order to enable the creation of a market and supporting infrastructure. The involvement of local governmental bodies is essential to reduce the uncertainty as the inconsistent application of legislation is the main source for uncertainty.

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13 Appendix A – Interview transcript B. Brink

Datum: 30-07-2010

Plaats: Steinfurt (Hoofdkantoor Kreiss Steinfurt)

Aanwezig: Jan Henry Wanink, Benedikt Brink

Onderwerpen

- Doorspreken key-factoren plan van aanpak
- Verificatie van reeds verkregen data
- Proces vanuit het perspectief van de Heckenmanager

Doorspreken key-factoren plan van aanpak

Regionale beschikbaarheid van Snipperhout in de Kreisen

Over de regionale beschikbaarhoud van snipperhout buiten de Hecken om kan geen zinnig woord gezegd worden. Gevoelsmatig zal dit volgens dhr. Brink echter bijna alleen maar afkomstig kunnen zijn van andere beheerswerkzaamheden (zoals weg- en waterbeheer).

Het potentiële aanbod aan Hecken in Kreiss Steinfurt alleen bedraagt 3.500 km. Per 100m per jaar is er een aangroei van $1m^3$. Voor Kreiss Steinfurt komt dit hiermee op een jaarlijks te kappen totaal van $3.500m^3$ (exclusief eventuele correcties voor achterstallig onderhoud). Versnipperd wordt een factor 2,5 gebruikt en komt men op een totaal van 87.000 sm^3.

Potentieel aanbod van Snipperhout van Hecken

Als na een periode van 10 jaar 50% van de aanwezige Hecken daadwerkelijk via de Heckenmanager beheerd wordt is dat een uitstekend resultaat. Een significant hoger percentage wordt vooralsnog niet voor mogelijk gehouden. Over 10 jaar wordt het maximum dus op 43.500 sm^3 per jaar geschat.

In november 2009 is de acquisitie van Hecken gestart. Op dit moment is pas 50 km beschikbaar gekomen in de portefeuille van de Heckenmanager. Als mikpunt na 3 jaar acquisitie wordt 500 km gehanteerd. De verwachting is dat het tempo van de acquisite in het komende jaar fors zal stijgen. Deels door bekendheid bij gemeenten waardoor aflopende contracten met onderhoudsbedrijven niet direct worden verlengd, deels door meer ervaring in de (en een actievere) acquisitie.

Opslag en verwerkingscapaciteit per Kreis

De opslag en verwerking wordt volledig door de firma die de opdracht tot het kappen verwerft verzorgd. Er is geen indicatie dat er een tekort aan ruimte is.

Aanbodfluctuaties

De verwachting is dat de weersinvloeden op de fluctuatie in aanbod minimaal zullen zijn. (Nader onderzoek/ informatie vanuit de biologische hoek is gewenst) Vanwege de structuur van de keten (acquisitie, beheer & bundeling van beschikbare Hecken tot aantrekkelijk bundels) zal het aanbod naar verwachting primair fluctueren op basis van de acquisitie.

Er wordt uitdrukkelijk gemeld dat het regionale aspect wellicht lastig te bewaken zal zijn. Er zijn al diverse partijen op de markt die jaarlijks >60.000 sm^3 nodig hebben. Deze partijen stropen nu al actief de markt af en hebben geen enkel probleem om enkele honderden kilometers te rijden (mits het te kappen gebied voldoende groot is voor enkele weken werk). Het alternatief voor hun is namelijk om het hout per trein uit Rusland te laten komen.

Note: op dit moment is de -regionale- keten nog niet volledig kostenneutraal. De grote partijen zijn echter bereid om tot enkele euro's boven de huidige marktprijs (de huidige prijs is ~-1 euro per m^2) te betalen!

(constante) Kwaliteit is nu een groot probleem. De enige afnemers die eigenlijk echt met de kwaliteitsfluctuatie om kunnen gaan zijn de grote niet regionale afnemers. Het heeft er echter alle schijn van dat de meeste firma's die deze werkzaamheden aannemen beschikken over mogelijkheden om de houtsnippers te drogen!

Aanvullingen op doelgroepen

Scholen en overige (overheidsbezit) openbare gebouwen. Dhr. Brink gaat proberen een lijst met gebouwen en aanspreekpersonen te verkrijgen.

Aanvulling op "concurrerende" alternatieven

Vanuit de Kreiss zijn er ook diverse andere projecten voor het stimuleren van het gebruik van alternatieve energiebronnen actief. Benedikt maakt een duidelijk verschil tussen het gebruik van installaties voor stroom en voor warmte. Houtsnippers vallen onder de laatste categorie, de andere projecten draaien om stroom.

Voor zowel zonne- als wind energie zijn er door de Duitse bondsregering aantrekkelijke subsidie-systemen actief. Precieze details zijn niet beschikbaar, maar bijvoorbeeld voor zonne-energie geldt dat de overheid een "afname verplichting" voor de komende 20 jaar van de opgewekte stroom opgelegd heeft aan de energie-bedrijven. Het tarief wat aan de "producent" betaald wordt is sterk gesubsidieerd (30 cent per Kw/h?)

Verificatie van reeds verkregen data

Benedikt Brink geeft aan dat hij het getal van 10.000 km als erg weinig inschat. Zijn eigen inschatting is dat het om ongeveer 15.000 km moet gaan. Alleen Kreis Steinfurt heeft al 3.500 kilometer en Kreiss Warendorf is volgens hem even groot. De andere 3 Kreisen zijn gezamenlijk zeker fors groter dan Steinfurt, derhalve de aanpassing van de schatting.

Proces vanuit de Heckenmanager

De acquisitie start met het aanspreken van de verantwoordelijken voor houtwallen in de 24 steden en gemeenten van Kreiss Steinfurt. De door deze partijen aangeboden Hecken zijn vervolgens het startpunt voor het combineren met de door de particulieren aangemelde Hecken (om zoveel mogelijk aaneengesloten gebieden te kunnen aanbieden). De eerste stap in het acquisitieproces met de gemeenten verloopt vooralsnog moeizaam, oa door lopende contracten met onderhoudsbedrijven.

Het voordeel voor de gemeenten is vaak een beperking van de kosten (via de Heckenmanager wordt het op grotere schaal aangeboden). De particulieren krijgen momenteel géén vergoeding (in tegenstelling tot wat uit het interview met von Gember naar voren kwam). Het voordeel voor de particulieren wordt strikt in de ecologische sfeer gezocht.

De Heckenmanager controleert of er beperkende voorwaarden zijn bij de diverse Hecken.

De bundels van gemeentelijke en particuliere Hecken worden aan regionale[8] ondernemers aangeboden, waarbij enkel de noodzakelijke informatie publiek beschikbaar wordt gesteld. Deze ondernemers brengen een bod uit op de bundel (waarbij het vooralsnog gaat om "zo laag mogelijke kosten voor de Kreiss"). Op dit moment is het gunstig als een bundel tegen 0-tarief aangeboden kan worden. Meestal moet er geld toegelegd worden, ~ € 1,00 per m^2. Geld ontvangen blijft naar verwachting toekomstmuziek (onder andere door de regionale beperking).

[8] De provincie / regionale overheden dragen fors bij aan dit project. Het beleid is om regionale gelden ook in de regio te houden.

14 Appendix B – Interview transcript B. Haver

Datum: 11 augustus 2010

Plaats: Nordhorn

Onderwerp: Interview Dhr. B. Haver

14.1.1 Actuele informatie

Hij wist niet goed om hoeveel km Hecken het gaat binnen het gehele projectgebied. Voor het gebied Nordhorn schat hij het totaal aantal km's op 1200. Voor het berekenen van de opbrengst hanteert hij eenzelfde factor die ook gegeven is door Dhr. B.Benedikt / Jan Henry, namelijk 2,5.

14.1.2 Proces

De eerste stap in het proces is het verzamelen en aanmelden van de Hecken (WallIs). Hierin ligt gelijk het grootste probleem. Dit werkt niet goed door de technische tekortkomingen van de website en het geld dat beschikbaar is om de (juiste) kaarten te gebruiken om de Hecken in te lezen.

De Hecken van gemeenten worden als startpunt voor de acquisitive gebruikt, maar deze zijn vaak niet direct beschikbaar ivm een meerjarig (realtief duur) onderhoudscontract van een loonbedrijf. Dit vertraagd de acquisitie. Actief acquireren op basis van het startpunt is noodzakelijk.

Vervolgens bundelt de Heckenmanager het aanbod van hout. Dit wordt vervolgens als een soort tender aangeboden aan de ondernemers in de regio. Hij is wel van mening dat als er vijf tenders zijn, en één ondernemer biedt op drie tenders, dat de ondernemer dan of drie tenders heeft of geen. Dit in verband met een stukje efficiëntie. Het hoeft dus niet zo te zijn dat altijd het hoogste bod geaccepteerd wordt.

Daarna is het aan de ondernemers zelf wat er gebeurt met de houtsnippers. Zij hebben niet de verplichting om het binnen de regio te verkopen. Hierin ligt dan ook het grootste probleem voor de filosofie achter het project, door de regio voor de regio. Ook hier speelt de factor geld een rol.

14.1.3 Kwaliteit

Dhr. Haver heeft het gehad over twee soorten houtsnippers dat aangeboden wordt; nat en droog. Het hout wordt gesnoeid en vervolgens naar een Biogas Anlage gebracht om daar te drogen of het wordt op een berg gegooid met een speciaal kleed erover en van daaruit verkocht. De prijs voor droog hout ligt aardig hoger dan nat hout, namelijk €3,- /4,- verschil per m³. Wel heeft hij aangegeven dat nat hout nog wel eens kon gaan broeien en soms schimmelen waardoor de het hout vrijwel onbruikbaar was voor de installaties. Voorzover bekend zijn er voldoende installaties voor het drogen van hout.

14.1.4 Verwachtingen over het aanbod

De medewerking van privé bezitters is vooralsnog niet erg veel. Zij krijgen (vrijwel) niets voor het hout en hij verwacht dat dit een van de belemmerende factoren is. Wat hij wel belangrijk vindt is dat het project ook niet geheel commercieel moet worden. Dit zou een tegenover gestelde reactie veroorzaken waardoor het ecologische aspect van het project niet gewaarborgd wordt.

Daarnaast heeft hij enkele bezitters gesproken en hij krijgt erg de indruk dat er weinig interesse is voor het project. Hij zou graag een manier zien waarop zij min of meer geforceerd worden om de Hecken aan te melden.

Hoeveel aanbod er buiten de controle van de Heckenmanagers is is onduidelijk, op dit moment is dit waarschijnlijk wel aanzienlijk. De meeste houtsnippers komen van "andere onderhoudswerkzaamheden" zoals uit bos- of wegbeheer.

14.1.5 Verwachtingen over de vraag

Op dit moment is de vraag naar de houtsnippers groter dan het aanbod. Er zijn grote commerciële partijen die hout opkopen (bijv. Biogas Anlage) maar ook privé afnemers en enkele bedrijven in de regio die het hout al gebruiken voor verwarming.

Zijn verwachting is dat Corporate Social Responsibility ook bij hen een steeds belangrijkere rol gaat spelen.

14.1.6 Visie op het project

Dhr. Haver is erg sceptisch over de haalbaarheid van het gehele project. Met name het regionale aspect is iets waarvan hij verwacht dat het niet/ nauwelijks haalbaar zal zijn. Als meest belangrijke factor ziet hij hier geld. Overheden zouden het regionale aspect kunnen versterken door als eerste optie te hebben op de houtsnippers en die dan te gebruiken voor de verwarming van regionale overheidsgebouwen.

Hij hoopt dat het project ervoor zorgt dat er meer draagvlak is omtrent het gebruik van houtsnippers voor verwarming. Hij verwacht dat als er een groter draagvlak is én wanneer er meer geld beschikbaar is, het project sneller uitgevoerd kan worden.

Het ecologische aspect wordt volgens hem nog wel eens onderschat. Vroeger deden Hecken dienst als grens met de buurman maar ook als een soort scherm voor de wind en schaduw voor de dieren die in de weilanden stonden. Hij hoopt dat ook dit punt wat meer gaat leven bij de bezitters. Vooral onder privé bezitters is er veel sprake van achterstallig onderhoud.

15 Appendix C – Interview transcript Mr. Bakker

Datum: 20-09-2010

Interview per telefoon

Dhr. R. Bakker – Hout CV

In welke gebieden levert u?

Levert alleen in Nederland (nl importeur), of incidenteel aan Nederlanders in het buitenland. Vanuit de fabrikant is er de beperking om in een specifiek handelsgebied te handelen.

Wat voor marktsegmentatie hanteert u?

In de particuliere markt zijn ketels van 30-40 Kw normaal. Waarschijnlijk heeft ongeveer 50% van de particulieren een 30 Kw ketel. 50 Kw is voor particulieren al echt groot.

In de zakelijke markt zijn ketels met een vermogen boven de 150 Kw groot, ongeveer 90% van de markt zal ketels tussen de 50 en 150 Kw gebruiken. Deze laatste groep is ook "kant en klaar" leverbaar, voor installaties boven de 150 kw komt het al snel op maatwerk neer.

Zijn er barrières zijn bij de implementatie van houtsnipperketels?

Het Nederlandse regeringsbeleid is een struikelblok. In Nederland zijn er emissie richtlijnen, de provincies voeren elk hun eigen beleid. Vergunningen zijn mede daardoor in sommige gemeenten helemaal niet te krijgen omdat de verantwoordelijke ambtenaar visioenen van "jaren 70 allesverbranders" heeft. Vanuit diverse milieu groeperingen is er veel weerstand wegens de uitstoot van fijnstof. Gelderland is de eerste provincie die een positief initiatief ontwikkelt.

De onzekerheid voor potentiële klanten is groot vooral vanwege de vergunningen, maar ook vanwege de kwaliteit die slecht gegarandeerd is in Nederland. Hout pellets zijn een veel beter alternatief.

In Duitsland zijn dit soort belemeringen totaal niet aanwezig, het regeringsbeleid is helder, eenduidig en wordt overal op dezelfde manier uitgevoerd. Vergunningen zijn niet nodig of een slechts een formaliteit. Als de blokkade van de fabrikant er niet was zou dhr. Bakker graag (veel) meer zaken in Duitsland aanpakken.

Aantal aanbieders

In Nederland is sprake van een enorme toename van het aantal aanbieders, het zijn bijn cowboytoestanden waar de helft geen verstand van zaken heeft. Er zijn meer dan 80 verschillende merken verwarmings systemen op basis van biologische brandstoffen te verkrijgen, van zeer gerenommeerde tot "goudzoekers". Dhr. Bakker heeft zelf ruim 15 jaar ervaring in de markt voor biologische brandstoffen en verwarmings systemen.

Invloed van logistieke factoren op de implementatie

De logistiek is zeer bepalend, juist vanwege de beperkte kwalitatieve controle. In Duitsland zijn deze problemen echter veel minder relevant, de kwaliteit is wat beter en er zijn meerdere aanbieders beschikbaar. Het is in ieder geval in Duitsland nog nooit een probleem geweest om een aanbieder voor de houtsnippers te vinden bij een nieuwe installatie.

Voor de Nederlands markt hebben pellets eigenlijk de voorkeur vanwege de prijszekerheid & vaste aanvoer (geen volume variatie).

Tot 100kw zijn houtsnippers (in Nederland) totaal niet interessant. De exploitatie kosten zijn relatief hoog en de onzekerheid over de kwaliteit houtsnippers (vochtigheid, formaat) is dat eveneens.

Vergelijking kosten houtsnippers vs. Gas

30kw kost ong 35000 euro (totaal, turn key) - 30kw gas 2000 euro

100kw kost ong 45000 euro