Profile and Perceptions of Biogas as Automobile Fuel

A Study of Svensk Biogas

Anneli Larsson

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The three interview segments were analyzed and compared in order to identify patterns, similarities and differences. Based on research data the thesis concludes that the profiling arguments of biogas correlates to that biogas is the most environmentally friendly fuel, the least expensive fuel, and locally produced. Furthermore, the company profile of Svensk Biogas is equal to sustainable alternative, locally produced, trustworthy, environmentally friendly and climate smart [klimatsmart]. Given the arguments of the company profile, environmental values seem to be the core communicating value. Profiling Svensk Biogas happens through events and by using communication material such as company logotype.

Motorists have an overall positive perception of biogas. Biogas users states environmental benefits as the key argument behind their commitment. Non-users are positive toward biogas although expressing a lack of knowledge confusing biogas with ethanol and bio-fuels in general. According to motorists the negative perceptions, in addition to the prerequisites of biogas, are connected to insufficient infrastructure of biogas filling stations, a short range of the biogas tank, a high investment cost of a biogas car, a biogas price increase, scarcity of cars, and information (lack of information and misleading information).

The overall perception of Svensk Biogas among biogas users is positive. Biogas users express a negative perception concerning the Svensk Biogas filling stations and also wish for a lower biogas price. Non-users express modest perceptions of the company. This research also concludes that perceptions of the biogas producer are correlated to the perceptions of biogas. Furthermore, biogas producer, users and non-users wish to be directed by political decisions, guiding them toward environmentally friendly fuel alternatives.
Acknowledgement

This thesis is designed in resemblance with my personal interest of environmental communication. I believe that environmental communication can play an important role in creating a sustainable society comprising environmental- social- and economical factors, in particular the understanding that environmental values do not have to oppress corporate values. The writing of the thesis has increased my knowledge of biogas and given me an understanding of the possibilities and barriers facing renewable automobile fuels.

First and foremost I would like to thank the company Svensk Biogas for their cooperation. Marie Pihlström has been an irreplaceable company mentor, from the planning phase of the thesis to its last written word, always encouraging and trusting my judgments. Furthermore, my academic advisor Victoria Wibeck has assisted me with valuable constructive ideas and guided me throughout the research process.

I would like to thank all interviewees and focus group participants for their contribution and valuable input. Their opinions are the foundation of the research and without them the obtained conclusions would not have been possible.

Last but not least I would like to acknowledge family and friends for supporting me throughout the research, in particular during its challenging moments. I would also like to thank Lena Hamilton and Linda Stenbom for editorial assistance.

Anneli Larsson

Norrköping, August 20th 2008
Abstract

From an environmental- and health perspective, biogas and other biomass-based fuels have several advantages; nevertheless the majority of motorists fill their cars with petroleum-based fuels. This thesis is designed to explore the profile of biogas in relation to its perceptions. It is a study concerning the communication between the biogas producing company Svensk Biogas and their biogas users and non biogas users. To obtain a thorough understanding of the profile and perceptions of biogas a qualitative approach was considered appropriate. Biogas users and non-users were interviewed at gasoline stations, while Svensk Biogas was interviewed as a group.

The three interview segments were analyzed and compared in order to identify patterns, similarities and differences. Based on research data the thesis concludes that the profiling arguments of biogas correlates to that biogas is the most environmentally friendly fuel, the least expensive fuel, and locally produced. Furthermore, the company profile of Svensk Biogas is equal to sustainable alternative, locally produced, trustworthy, environmentally friendly and climate smart [klimatsmart]. Given the arguments of the company profile, environmental values seem to be the core communicating value. Profiling Svensk Biogas happens through events and by using communication material such as company logotype.

Motorists have an overall positive perception of biogas. Biogas users states environmental benefits as the key argument behind their commitment. Non-users are positive toward biogas although expressing a lack of knowledge confusing biogas with ethanol and bio-fuels in general. According to motorists the negative perceptions, in addition to the prerequisites of biogas, are connected to insufficient infrastructure of biogas filling stations, a short range of the biogas tank, a high investment cost of a biogas car, a biogas price increase, scarcity of cars, and information (lack of information and misleading information).

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1. Introduction

Reducing greenhouse gas emissions and society’s dependence on fossil fuels has become one of the twenty-first-century’s most extensive challenges. One of planet earth’s major fossil resources is oil, stored in the bedrock through thousands of years. In modern society crude oil has been extracted in order to be refined and used in a variety of production processes (The Swedish Petroleum Institute, 2007).

Oil in the form of gasoline is a powerful energy source used to fuel the majority of all automobiles (The Swedish Petroleum Institute, 2007). However, combustion of gasoline generates discharge of for example carbon dioxide, nitrogen oxides and particles. These substances cause environmental problems such as ozone depletion, eutrophication, and acidification. In addition, they cause severe health problems. Incineration of gasoline also promotes discharge of greenhouse gases contributing to a global warming of the atmosphere (SIKA, 2008).

The movement toward usage of renewable energy sources is a slow but nevertheless inevitable progression. In January 2007 the European commission adopted an integrated climate- and energy policy, including a binding minimum target of 10 % bio-fuels by 2020. (Sveriges Riksdag, 2008). The main bio-fuels within EU are bioethanol and biodiesel, produced within the European agriculture. However, some bioethanol- and biodiesel production processes have limitations regarding energy efficiency and reduction of greenhouse gases. From an environmental and resource-efficiency perspective biogas has several advantages in comparison to other renewable vehicle fuels (Börjesson & Matthiasson, 2007).

In spring 2006 the Swedish government decided that all major gasoline stations were required to offer a renewable fuel alternative. The outcome of this decision was that most suppliers chose ethanol because of its lower investment cost; biogas is about ten times more expensive than ethanol to install. The regulation has been criticized due to its negative effect on the development of biogas. In 2007 Volvo, the foremost producer of biogas cars in Sweden, decided to end their production of biogas cars. According to the company the production was no longer profitable and instead Volvo committed to eco cars running on ethanol and biodiesel (Wallner, 2008).

1.1 Research problem

From an environmental- and health perspective, biogas and other biomass-based fuels have several advantages (Börjesson & Matthiasson, 2007); nevertheless the majority of motorists fill their cars with petroleum-based fuels (Romm, 2005). According to Romm (2005) alternative fuel vehicles have throughout the years faced the following barriers: a high investment cost, limited range of the tank, safety concerns, high fueling cost, limited fuel stations (chicken and egg problem), and improved competitive gasoline automobiles. Romm refers to a chicken and egg problem and asking - who will produce and purchase these automobiles if there is no infrastructure of filling stations, and who will install filling stations if there are no automobiles?

To increase the demand of biogas there is a need for political- and economical incentives, public communication efforts, retailers of biogas cars, and available biogas filling stations. In
addition, motorists have to acknowledge the fuel, start purchasing biogas cars, and demand biogas at their filling stations. If biogas is to gain customers and market share it is important for the biogas business to know their customers, and vice versa. The knowledge about one another contributes to a good relationship between biogas producers and users. If a good relationship is formed, biogas and other potential renewable fuels can play an important role in societies’ shift from finite- to renewable energy sources.

In order to study the relationship between biogas producer, users and prospective users the company Svensk Biogas AB (Svensk Biogas Ltd) was contacted and chosen for cooperation. The company has existed since 1996 and is the number one producer of biogas as vehicle fuel in Sweden and Europe. During the past few years there has been some reorganization within Svensk Biogas and questions concerning qualitative company values, in addition to a curiosity regarding the company profile have emerged.

1.2 Aim and research procedure

The aim of the thesis is to explore the profile of biogas in relation to its perceptions. It is a study concerning the communication between the biogas producing company Svensk Biogas and their biogas users, in addition to non biogas users. To bring about an answer to the aim the following research questions have been formulated:

- What is the profile of biogas and Svensk Biogas, and how is the company profile communicated to users and non-users?
- What are the perceptions of biogas and Svensk Biogas among users and non-users?
- Does the profile of biogas resemble the perceptions of biogas among users and non-users?
- Does the company profile of Svensk Biogas resemble the perceptions among users and non-users?

To approach the aim of the research three sets of interviews will be conducted:

1. Representatives from Svensk Biogas will be interviewed as a group to discuss their views on biogas (profile) and their company profile.

2. Biogas users will be interviewed and asked to give their perception of biogas and Svensk Biogas.

3. Non-users will be interviewed and asked to give their perception of biogas and Svensk Biogas.
1.3 Research scoop

Svensk Biogas is effective in three counties of Sweden (Östergötland, Sörmland and Närke); the thesis is limited to the region of Östergötland and particularly the cities of Linköping and Norrköping. Linköping is the hometown of Svensk Biogas and the center of biogas development in Sweden, while Norrköping is the adjacent city and also where Svensk Biogas has their green gas facility located.

Svensk Biogas produces biogas to a variety of customers and vehicles; however the focus of this study is private motorists and their automobiles. This decision is based due to the current media debate regarding the type of fuel motorists ought to choose in order to support the environment.

Svensk Biogas produces both biogas and green gas. These gases are both methane-gases with a difference concerning the raw-material. Green gas is produced from grain, while biogas can have a more multifaceted origin, although most often derived from organic waste. Furthermore, the fertilizer produced at the green gas plant is biodynamic and can be used in regional ecological farming. Despite these differences, in this thesis green gas and biogas will be treated as synonymous without regard to if motorist fill their cars with biogas or green gas.

There are a number of automobile fuels available on the market, this thesis is limited to biogas in relation to gasoline, diesel and to some extent ethanol. Gasoline and diesel are the two major fossil fuels, while ethanol is the most common renewable fuel (SIKA, 2008).
2. Background

In this chapter there will be a company description of Svensk Biogas AB and biogas as automobile fuel will be discussed focusing on the biogas process, environmental contributions, the biogas car and economic initiatives.

2.1 Company description

2.1.1 Svensk biogas AB

In the late 1980’s and the beginning of the 1990’s, the municipality of Linköping was facing two problems, one being severe air pollution in the inner city, while the other was the abattoir industries waste surplus. In 1996 the Tekniska Verken group, together with Swedish Meats and LRF (The Federation of Swedish Farmers) formed the company Linköping Biogas AB. The company intended to produce biogas to the public bus service and concurrently decrease air pollution in the city. The biogas production was based upon slaughter-house residue and thereby formed a solution to their waste surplus. In 2003 the company Svensk Biogas AB was formed with the assignment to continue the regional biogas development. In 2004 Linköping Biogas and Svensk Biogas became one company and retained the name Svensk Biogas AB (Svensk Biogas, 2008).

Today, Svensk Biogas is one of seven subsidiaries within the Tekniska Verken group. The group is the largest employer in the municipality. It is a utility company with its main focus on energy- and environmental solutions, offering regional service to the residents of Linköping. In 2001 Tekniska Verken became certified by the international environmental management standard ISO14001 and thereby obliged to have routines, a collective environmental policy, and work toward continuous environmental improvement (Tekniska Verken, 2006).

Svensk Biogas has seven employees at their office and thirteen people working at the two production facilities. The main production installation is located in Linköping, while another was inaugurated in Norrköping in 2007. The company has a number of gas filling stations in the southeast region of Sweden, while their know-how of production processes is applied on the international market. Svensk Biogas and the municipality of Linköping has since the start in 1996 been recognized both nationally and internationally for their successful biogas program. During the ten years that the company has been effective approximately 130 million SEK has been invested in the company and today Svensk Biogas is the number one producer of biogas as vehicle fuel in Europe. About 5 % of the total vehicle-fuel-market in Linköping is biogas, which also corresponds to the EU goal of sustainable development set for 2010 (Tekniska Verken, 2006).

2.2. Biogas as automobile fuel

2.2.1 The biogas process

The raw-material of biogas often consists of sewage water, abattoir remains, food industry waste, or grain, brought together with manure. The material is hygenized and pumped into a digester where micro organisms break down the substance in an anaerobic process,
meanwhile producing gas. To be able to use the gas as a vehicle fuel hydrogen sulphide, water and carbon dioxide have to be removed. This process will raise the methane content to 96 - 98 % which corresponds to the energy content per cubic meter of gasoline and diesel. In order for biogas to be used in vehicles the produced biogas has to meet the Swedish standard SS 15 54 38 – Biogas as a fuel for high speed Otto engines (Jarvis, 2004).

The gas is finally odorized and compressed to about 200 bars and distributed to biogas filling stations, either through underground pipelines or by gas trailer tanks. Besides producing a vehicle fuel the biogas process creates a digested residue. The nature of the residue is determined by the raw-material, although in most cases it is a fertilizer that can be used in agriculture replacing artificial fertilizers (Jarvis, 2004).

2.2.2 Environmental contributions

Biogas is a renewable energy source and the carbon in biogas originates from carbon used by plants during their photosynthesis and is already a part of the biosphere’s carbon circulation. Production of biogas as automobile fuel reduces the quantity of organic waste and contributes to material circulation and a more sustainable society (Jarvis, 2004).

Biogas is classified as the cleanest fuel on the market and produces no emissions of benzene and toluene. In comparison to gasoline and diesel, biogas vehicles have a lower discharge of carbon monoxide, hydrocarbons, nitrogen oxides and sulphuric compounds. The methane in biogas is non-toxic and lighter than air, thus in the event of an accident it will rise and be diluted by air. Biogas in itself has no odor and the engine of the car is quieter than traditional automobiles. In urban areas these factors contribute to decreased air pollution and reduced traffic noise (Jarvis, 2004).

The main compound in biogas is methane, a gas that has a twenty times stronger greenhouse effect than carbon dioxide. The total amount of combusted carbon dioxide in the atmosphere is higher than methane and corresponds to 60 % of the total greenhouse effect contribution, while methane is responsible for 20 %. Even so, methane leakage should be minimized and monitored during all its handling steps, from the digestion process to its final use as automobile fuel (Jarvis, 2004).

2.2.3 The biogas car

There are a number of biogas car models available on the market; in 2007 there were 12 900 gas cars (including biogas and natural gas) registered in Sweden. In relation to gasoline-, diesel-, and even ethanol cars, this number is still modest (Miljöfordon, 2008). In comparison to gasoline filling stations the accessibility of biogas filling stations is rather restricted. A majority of the biogas filling stations are located south of Stockholm, particularly along the main highways (SIKA, 2008).

The main difference between a biogas car and a conventional car is its two tank systems, one biogas tank in addition to a gasoline tank. The vehicle generally need gasoline in the starting moment and then automatically shifts to biogas within a few seconds. A biogas car requires to be refilled after approximately 300 kilometres of driving; in the event the car runs empty the gasoline tank can be switched on (Jarvis, 2004).
The energy content of biogas is connected to the content of methane; a normal cubic meter of methane has a calorific value of approximately 10 kWh. The energy content of biogas, gasoline and diesel are comparable, while ethanol has lower energy content (Clementson, 2007). Below is a table of vehicle fuels and their energy content (Table 1).

Table 1. Vehicle fuels and their energy content

<table>
<thead>
<tr>
<th>Fuel Description</th>
<th>Energy Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Nm³ biogas (97% methane)</td>
<td>9.67 kWh</td>
</tr>
<tr>
<td>1 litre gasoline</td>
<td>9.06 kWh</td>
</tr>
<tr>
<td>1 litre diesel</td>
<td>9.80 kWh</td>
</tr>
<tr>
<td>1 litre E85 (85% ethanol)</td>
<td>6.60 kWh</td>
</tr>
</tbody>
</table>

1Nm³ biogas corresponds to approximately 1.1 litres gasoline

Source: (Clementson, 2007)

2.2.4 Economic incentives

The price of a new biogas car is approximately 10 - 20 % higher than a conventional car (Jarvis, 2004). A biogas car is furthermore an eco car [Miljöbil], a term used to describe vehicles with low emissions of damaging substances and greenhouse gases. In pending definitions a low noise level will also be required to get the eco car label. However, there is no single definition and eco cars can vary between fuel efficient gasoline or diesel cars, flexi fuel vehicles driven on ethanol and gasoline, or biogas automobiles. To encourage the development of fuel efficient cars, in addition to cars driven on renewable fuels, the governmental Swedish Road Administration gives an eco car subsidy of 10 000 SEK to individuals purchasing a new eco car. The subvention has been effective since April 1st 2007 and will run until December 31st 2009. For individuals driving an eco car there are additional economic benefits, such as free municipality parking and exemption from the congestion tax in the capital city Stockholm (The Swedish Road Association, 2007). The main purchasers of automobiles driven on renewable fuels are corporations (SIKA, 2008). Companies are entitled to a 20 - 40 % lower taxable benefit value if they use a flexifuel-, bifuel-, electric-, or hybrid electric automobile (The Swedish Road Association, 2007); hence these vehicles are often used as both company- and private car.

The price of automobile fuel is an important economic parameter for motorists, below is an price comparison of biogas, gasoline, diesel and ethanol (Table 2).

Table 2. Automobile fuels and price

<table>
<thead>
<tr>
<th>Fuel Description</th>
<th>Price (SEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Nm³ biogas (Svensk Biogas)</td>
<td>10.58</td>
</tr>
<tr>
<td>1 litre gasoline (octane 95)</td>
<td>13.39</td>
</tr>
<tr>
<td>1 litre diesel (ACP diesel)</td>
<td>14.19</td>
</tr>
<tr>
<td>1 litre Ethanol (E85)</td>
<td>8.49</td>
</tr>
</tbody>
</table>

The biogas price in relation to gasoline is approximately 9.62 SEK/litre
The ethanol price in relation to gasoline is approximately 11.46 SEK/litre

The price of automobile fuels fluctuates; however, biogas is less expensive than gasoline, diesel and ethanol. In order to compare the price of different automobile fuels their energy content and the engine fuel consumption has to be incorporated. A diesel engine for example has a low fuel consumption, while ethanol has low energy content, and the price of ethanol has to be multiplied by approximately 1.35 (8.48 SEK * 1.35 = 11.46 SEK) in order to be comparable with gasoline (Miljöfordon, 2008).
3. Method

Throughout this chapter the research method will be explained in the context of research design, selecting interviewees, planning the interviews, conducting the interviews, analyzing the interviews, and research validity.

3.1 Research design

The research was designed to explore the viewpoints (profile and perceptions) of biogas as automobile fuel, among producer, users and non-users. In order to obtain a thorough understanding of the profile and perceptions of biogas, a qualitative approach was considered appropriate. The qualitative method render possible to unfold a subjects understanding and perception of a certain matter (Kvale 1996), in this case biogas and the company Svensk Biogas. The three interview segments were analyzed and compared in order to identify patterns, similarities and differences. Before conducting the interviews a thorough literature review was performed to attain an overview of previous and present research of relevance to the thesis topic.

3.2 Selecting the interviewees

To gain an understanding of the producer perceptive of biogas, in addition to their company profile, a focus group interview was conducted. This method gave an opportunity to study a group’s thoughts and believes about a certain topic (Morgan, 1998). Recruiting the group participants was done in dialog with Svensk Biogas with the intention to choose participants appropriate to discuss the profile of the company. According to Morgan (1998) the ideal number of participants is six to eight people. Some members of the Svensk Biogas group unfortunately had to cancel their participation, resulting in a focus group of four people.

To study the perceptions of biogas (and Svensk Biogas) among motorists, individual interviews were conducted. The purpose was to obtain individual perceptions concerning a particular matter (Kvale, 1996). There was also an interest in approaching motorists in their daily life and in the context of automobile fuels. This resulted in a decision to conduct the interviews at filling stations, at locations where motorists were exposed to both biogas- and gasoline filling stations. Since Svensk Biogas is located in Linköping it seemed interesting to explore whether or not the perceptions among motorists differed between Linköping and its neighbouring city Norrköping.

The thesis derives from a curiosity of understanding why motorists reject shifting from finite- to renewable fuels. The number of interviews with biogas users is deliberately less than with non-users, since biogas users have already shifted to a renewable fuel. The exact number of interviewees depended upon their answers, although with aspire of attaining saturation, where additional interviewees provided little new knowledge (Kvale, 1996). When interviewing the motorists it was important to keep an even division between the sexes and an even number of interviews in Linköping and Norrköping, to avoid a biased research data.

3.3 Planning the interviews

The focus group interview and the individual interviews were semi-structured. This made it possible to cover certain topics, yet gave the flexibility of rephrasing and changing the
sequence of the questions (Kvale, 1996). For example, the focus group discussion covered certain topics and at times the moderator directed the discussion in order to cover the set agenda.

The three interview segments Svensk Biogas, users, and non-users, each had their unique interview guide (see Appendix). To be able to compare the segments the three interview guides covered more or less the same topics, however the composition of the questions were adjusted to suite each segment. Instead of asking motorists about their perception, a daily vocabulary was used, resulting in questions such as *what are your thoughts and opinions..?*

It was important to balance the length of the interviews with the aim of obtaining descriptive answers from the interviewees. The understanding was that motorists fueling their cars would not have time to answer questions for more than ten minutes. At the same time it was essential to avoid getting a standardized survey. In order to acquire a good balance, the interview questions were centered on the topic of biogas and constructed in a descriptive language.

When studying the profile of Svensk Biogas their communicating company values were of importance. To approach the matter the company logotype of Svensk Biogas was chosen as a suitable tool. A logotype is a graphic communicator of company values. The idea is to have customers recognize and remember the logotype and connect the logotype to a company and their communicating values (Holger & Holmberg, 2002). During the focus group interview the company logotype was discussed in relation to what it ought to communicate. The interviewer also showed the Svensk Biogas logotype on an A4-paper (modified, not revealing the company name) to non-users and asked them to identify the logotype.

### 3.4 Conducting the interviews

Before conducting the interviews both Svensk Biogas and motorists were informed about the overall purpose of the research and promised anonymity (Kvale, 1996). Svensk Biogas was also encouraged to give their consent regarding the thesis content. All interviews were recorded and stored on a digital dictaphone.

The Svensk Biogas focus group interview took place at their office in Linköping during a one hour meeting. One participant was unable to take part of the first half of the discussion, when joining the group the participant got informed of earlier discussed topics.

The individual interviews were conducted at two specific gasoline stations in Linköping and Norrköping. These two stations were selected in dialog with Svensk Biogas based on the fact that they offered a variety of automobile fuels and also expected to have a good influx of private biogas users. Since the research focused on private motorist, interviewing taxi drivers and drivers of company cars was avoided. At times individuals used their automobile as both company- and private car, in these situations the motorist was interpreted as a private person and could therefore be interviewed.

Interviewing biogas users required standing at the biogas filling stations area for approximately fifteen hours. During these occasions there was modest arrival of private motorists. A total of fifteen biogas users were interviewed, one of them was removed from the research data since the interviewee had a personal relationship to Svensk Biogas.
Conducting interviews with non-users required approximately eight hours. During these occasions the problem was not a low influx of motorists, though the fact that it was difficult to find women since the majority of the fueling motorists were men. A total of 32 non-users were interviewed, four interviewees being withdrawn from the research data. The reason for this was that two of them lived outside the geographic region of the thesis (Östergötland); one used a borrowed car, while another drove a company car.

Below is a table of the three interview segments, including the number of interviews, division of sexes, and age-span (Table 3).

Table 3. The three interview segments

<table>
<thead>
<tr>
<th>Segments</th>
<th>Interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Svensk Biogas</td>
<td>Focus group interview:</td>
</tr>
<tr>
<td></td>
<td>4 participants, 2 women and 2 men</td>
</tr>
<tr>
<td>Biogas users</td>
<td>A total of 14 interviewees, from 29 - 63 years</td>
</tr>
<tr>
<td></td>
<td>7 in Linköping, 4 women and 3 men</td>
</tr>
<tr>
<td></td>
<td>7 in Norrköping, 3 women and 4 men</td>
</tr>
<tr>
<td>Non-users</td>
<td>A total of 28 interviewees, from 23 -70 years</td>
</tr>
<tr>
<td></td>
<td>14 in Linköping, 7 women and 7 men</td>
</tr>
<tr>
<td></td>
<td>14 in Norrköping, 7 women and 7 men</td>
</tr>
</tbody>
</table>

3.5 Analyzing the interviews

Before analyzing the recorded interviews the material had to be transcribed from oral to written form (Kvale, 1996). The purpose of the transcription was to focus on what was said, without intention to investigate underlining thought and opinions or linguistic comprehensions. Pauses and interruptions were marked [...] and laughter for example was put as [laughter].

Analyzing research data had the purpose of finding interviewee arguments and determine whether particular arguments were returning, followed by a comparison between the three interview segments.

3.6 Research validity

This research is intended to manifest opinions and viewpoints of selected interviewees. To determine its scientific contributions research data have been put in context of previous and present research. I have personally analyzed and interpreted the research data and it has been essential to maintain a reflexive approach throughout the composition of the thesis. All things considered, it is important to discuss a few aspects of the research method.

The research data consist of interviews; a context where interviewer and interviewee are in dialog with one another. The personal interaction in an interview always affects the situation
(Kvale, 1996). To create a good balance of interaction the interview guides (see Appendix) were designed to put focus on the interviewees, and their thoughts and opinions.

Among motorists and in the focus group, there were individuals more willing to express their opinions. To encourage the less expressive interviewees the interviewer refuted short answers with follow-up questions, or rephrased questions, in order to obtain descriptive answers. At times, motorists consented being interviewed, though their body language signaled stress. The interviewer then imposed a calm disposition and did not push for follow-up questions.

The interviews were conducted and transcribed in Swedish, while the thesis was written in English. To avoid linguistic misconceptions the level of transcription was rather detailed. During the research analysis I went back to the recorded oral material to obtain and secure an accurate understanding of the research data.

The concluding part of the thesis aligned thesis aim with obtained research conclusions, to determine that the thesis answered the questions it had proposed to answer.
4. Theoretical framework

Profile and perception are fundamental theoretical concepts throughout the thesis and within their context logotype and corporate brand will be discussed. Influencing motorist to shift from finite- to renewable fuels will be approached in the context of persuasion.

4.1 Profile and perception

It is rather difficult to draw a line between the internal- and external communication of a company. The outward communication is normally integrated and communicated within the organization, especially immaterial values such as quality and environmental awareness. These values might determine whether or not potential customers affiliate with a company and their product (Heide, 2005).

Researchers differ in their definitions of the terminology connected to organizational communication. In Sweden, profile and image are common concepts to describe the relationship between a company and its outside world (Palm, 1994). Anglo-Saxon literature does not utilize the word profile and instead a variety of concepts are being used, for example intended image, projected image and corporate identity (Brown et al., 2006). Some Public Relation researchers do not wish to use the concept of image, stating that it is too unspecific. One of them, James Grunig (1993), explains that with various denotations of image, it is impossible to define, measure, and observe. He rather uses the vocabulary of perception and evaluation, while his colleague Scott Cutlip prefers reputation (Larsson, 2001).

The thesis will focus on two of the above concepts, profile and perception. In literature, these concepts are normally applied upon companies, however in this thesis they will be used on both company (Svensk Biogas) and product (biogas). In the context of biogas, profile and perception will be utilized to describe the understanding of biogas among producer (profile), in relation to users and non-users (perception). According to Larsson (2001) the profile of a company represents how the company aspires to be perceived by external stakeholders. In the context of the thesis, profile correlates to the way Svensk Biogas wishes to be perceived by customers and prospective customers. Supported by the argumentation of Grunig (1993), that perception is more specific than image; the thesis will use perception rather than image. In literature both perception and image are present and the thesis will therefore place perception on an equality with image and treat them as synonyms, henceforward only perception will be used. In itself, perception is the process through which people understand the world. It includes selecting, organizing and encoding of the messages we meet through our senses (Dimbleby & Burton, 1998). “Perception is a fundamental aspect of decoding meanings and depends on our knowledge, beliefs and experience” (Dimbleby & Burton, 1998:264).

A company profile is deliberately produced and planned with the intentions of obtaining certain goals and leave an impression with the customer (Heide, 2005). In order to understand the relationship between profile and perception, it is noteworthy to briefly enlighten the concept of identity. At times, identity is used to describe the concept of profile; however identity is an underlying state while profile ought to be deliberately communicated. The company profile can for example be represented by logotype, architecture and presentation material. The profile can be directed and adjusted, while the identity is rather difficult to influence (Larsson, 2001). Below is a figure of the correlation between profile, identity and perception.
Profile and identity represents a company ideal, whilst perception corresponds to the way the external world actually interprets the company (Larsson, 2001). The customers’ perceptions derived from internal- and external company associations. The internal aspect is connected to apprehended company values and reputation, while for example company products bring about external associations (Heide, 1996). The received individual perception is influenced by sources outside the actual company, for example, competitive products, media content, and social networks (Brown et al., 2006).

In an ideal world, public perceptions ought to equal the intended company profile; however this is seldom reality (Larsson, 2001). In order to close the gap between profile and perception, the company has the possibility of indirectly effect the public perception by modifying the profile (Brown et al., 2006). If people experience a negative perception of the company, it might be considerable to strengthen the company profile. This could be manifested by adjusting the product, or improving the social- and environmental commitments of the company (Larsson, 2001).

4.1.1 Logotype

A company profile communicates manifested company values to the outside world, while profiling is related to graphical aspects of the communicating process (Heide, 1996). Profiling can be accomplished by using the graphic communicator of a company logotype (Holger & Holmberg, 2002). In the context of studying the profile of Svensk Biogas and the perception among users and non-users the Svensk Biogas logotype were put at scoop.

A logotype is used as a communicating instrument between company and customers with the aim of attaining customer recognitions. Giving attention to a logotype is intended to denote a specific company and its imbedded values (Holger & Holmberg, 2002).

4.1.2 Corporate brand

Profile is a central theoretical concept of the thesis and by using the concept the thesis aspires to explore the qualitative values of Svensk Biogas. It is therefore of relevance to briefly turn to the concept of corporate brand.

According to Heide (1996) the company profile is equal to the concept of corporate brand, and stands for the immaterial values that an organization deliberately wishes to communicate to stakeholders. Corporate brand has a long-term perspective and aspires to attract not only customers but all stakeholders of relevance to the organization. However, corporate brand differ from product brand, which is related to a certain product and often with a short term
perspective. A company might also have different products and consequently a variety of products brands. At times, the two concepts are one and the same, for example coca-cola (company and product) and Volvo (company and product) (Heide, 1996). A few companies have succeeded to communicate particular values which they almost become identical with. IKEA for example, is communicating an “affordable urban lifestyle”, while the communicating value of Volvo is “safety” (Knowles, 2001:44).

4.2 Persuasion

For centuries, there has been a debate concerning the defining characteristics of the rhetoric concept of persuasion and conviction. To persuade is to influence another person with the “power of verbal and nonverbal symbols” (Miller, 1980:4). There has also been a discussion regarding its indirect coercive aspect and if convincing ought to be more suitable. Choosing which terminology to use often evolves deciding upon the way influencing ought to be accomplished (Miller, 1980).

The thesis will now leave the discussion concerning which concept to use and align with the idea of persuasion. This decision is based upon my personal understanding that convincing is not enough in the context of shifting from finite- to renewable automobile fuels. Influencing motorists will most likely acquire indirect coercion, in the form of economic- and political means of control. The literature uses both persuasion and conviction without distinct boundaries; the thesis will therefore place the two on equal footing, henceforward only persuasion will be used.

In Public Relations, persuasion in often connected to campaigns aiming for a change of behavior among individuals. The thesis does not intend to study a biogas campaign, although it has an interest in the behavior of motorists with an underlying research problem of getting motorist to shift from finite- to renewable fuels.

There are several models and theories explaining how people are persuaded by communication where a majority follows the elements of knowledge – attitude – action. One of them is AIDA(S) attention – interest – desire – action, later on supplemented with satisfaction. The key-words represent the process of targeting attention toward something, until committing to that concept (Larsson, 2001). The attention phase is sometimes divided into two phases, opening- and continuing attention; hence, it is only possible to persuade an individual if he or she experiences continuing attention. The feeling of satisfaction can be described as to affiliate people into a culture, where the company is connected to a set of values. These values are embedded within company products and by driving a particular car, choosing what clothes to purchase, or buying certain groceries, individuals communicate a message to the surrounding world (Larsson, 2001).

AIDA(S) and other similar formulas assume a rational individual possessing a great state of awareness and that information processing follows a certain pattern. Despite this, within theories about influencing people, there is also the understanding that the social context has an effect upon people, resulting in a less rational individual. The less rational individual might have a more unconscious behavior which contributes to shift the processing order (Larsson, 2001).
5. State of the art

In this chapter appropriate state of the art will be presented. The chapter will focus on public perception and consumerism with the examples of environmental consumerism – research background, consumers’ green commitment, acceptance of ethanol-blended gasoline, and environmental behavior in relation to brand value.

5.1 Public perception and consumerism

Performing a thorough literature review, it became apparent that scientific research upon the subject profile and perceptions of biogas was, noteworthy, more or less non existing. Going around the topic and searching for similar studies related to bio-fuels or bio-energy, a handful of studies were found. The chosen studies are expected to facilitate a research endorsement and framework, hence place the thesis in relation to comparable research.

5.1.1 Environmental consumerism – Research background

The aim of the thesis is not to investigate consumption behavior; nevertheless, giving ones perception of biogas is possibly linked to ones consumption patterns. There are a variety of researches based upon environmental consumerism; however, to my attention nothing related to the consumption of automobile fuels. Despite this, there will be a brief review, although without going too deep into the subject since that would result in loosing track of the thesis aim.

According to Walter Coddington (1993) consumers are becoming more environmentally aware, but at the same time concerned although confused, indefinite to what to do and how to act. One explanation that he points out is that scientific sources sometimes send mixed messages regarding what is best for the environment. Furthermore, media; for example television, has a particular effect upon how people perceive facts. Companies are typically not the source of information that people turn to in the context of environmental information (Coddington, 1993).

In 1990 an American study by The Roper Organization together with the company S.C. Johnson & Son, Inc. developed a segmentation of consumers’ environmental attitudes. The study brought about five categories. True-blue greens representing the most engaged consumer, the greenback greens willing to pay a higher price for green products, the sprouts represented the middle-way, somewhat concerned although not reflected in their behaviour. Grouisers blamed their lack of environmental contribution by the lack of others. The fifth group basic brown did not think individuals could make a difference in the context of solving environmental problems. Additional surveys, performed in the USA during the same time made the generalization that the more income and schooling you have the greener you are, and furthermore that women tend to be greener then men (Coddington, 1993).

In order to understand why some motorists commit to renewable automobile fuels while others do not, the above review enlightens some fundamental research findings. However, the studies are a few years old implying that the field of research since then has cumulated.
5.1.2 Consumers’ green commitment

In a study by Leena Haanpää (2007), green consumer behaviour was discussed in the context of the postmodern lifestyle. Finnish customer-behaviour related data was analyzed in order to determine what constitutes a green lifestyle. The author refers to the present postmodern era where consumption is replacing production, as the driving force behind societal development. The results showed that when studying the level of green commitment lifestyle was a better parameter than socio-economic background. The way individuals consume can be correlated with the level of their green commitment (Haanpää, 2007).

The study of Haanpää (2007) implies that the motorists’ lifestyle is the determining factor to whether or not they commit to biogas. However, the study is based upon analyzed consumer data without personal interaction with the respondent.

5.1.3 Acceptance of ethanol-blended gasoline

In early 1980s, gasohol (10% ethanol and 90% gasoline) was sold at fueling stations in Oklahoma, USA. In 1983 a removed tax exemptions on gasohol was reinforced, resulting in decreased sale and negative impact in the public perception of ethanol (Ulmer et al., 2004).

In 2002 a research was conducted to determine the Oklahoman residents’ knowledge and perception toward reintroduction of ethanol blended gasoline. The empirical material consisted of a mail survey sent out to 685 respondents. The result indicated that the respondents had a positive understanding of a reintroduction, hence ethanol would have a positive effect upon the Oklahoma economy, reduce foreign oil dependency and furthermore ethanol had environmental benefits compared to gasoline. Cost, was the most essential parameter, before environmental benefits and vehicle performance, for motorists deciding upon committing to ethanol blended gasoline. A majority of the respondents claimed they would purchase ethanol if it became available once more (Ulmer et al., 2004).

The ethanol-study has similarities with the thesis given the fact that both studies explore motorists’ perception on an alternative vehicle fuel. Ethanol and biogas are equally bio-based automobile fuels and part of the current media debate. One of the differences between the two studies is that one is conducted in the USA, while the other is performed in Sweden, which for example brings about different demographics and cultural aspects. Furthermore, the two studies manage different methods; the biogas research explores values and perceptions by conducting individual interviews, while the research data of the ethanol-study is based upon a quantitative survey, conveying a generalized view upon its research topic.

5.1.4 Environmental behavior in relation to brand value

This research is a company report and not a peer reviewed scientific article, although relevant because its focus on consumers perception, corporate values and green consumerism, all of relevance to the thesis.

In the year of 2007 one of the largest global research projects was performed by Ipsos MORI on behalf of Tandberg. The study consisted of interviews conducted through an omnibus

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1 Ipsos MORI is a research company, offering quantitative and qualitative research services to companies (Ipsos MORI, 2008).
survey in 15 countries. The intention was to determine how companies’ environmental obligations were perceived by customer and company employees, furthermore its impact on brand values (Tandberg, 2007).

The main result of the research was that corporations with a responsible environmental behavior increased their brand value and comparative advantages. Consumers were positive toward environmentally responsible corporations and also more willing to purchase their green products. Despite the result, 32% of the respondents had not changed their behavior in order to reduce climate change (Tandberg, 2007).

About half of the respondents claimed that international governments ought to take the lead in limiting the effects of climate change. This could be done by for example imposing governmental policies and subsidies. In influential economics such as the USA and Germany, it was a greater expectation upon corporations to take a leading role. A fourth of the respondent thought the individual had the core responsibility (Tandberg, 2007).

In relation to the thesis, the Tandberg study brings important insight to how motorist might perceive the environmental product of biogas. Biogas is an environmentally friendly fuel alternative, hence the company Svensk Biogas has an environmental approach. The Tandberg study raises the topic of brand values, a question related to the profile of Svensk Biogas and the perceptions of the company and their imbedded values. In resemblance to the Oklahoma ethanol-study (Ulmer et al., 2004), the Tandberg research is based upon a quantitative investigation, furthermore with conclusions representing customers in 15 different countries. Within these results there are most likely variations that the statistics cannot embrace.

The Tandberg study refers to a division of responsibility related to climate change, a term implying various denotations. In the interview guide of the thesis (see Appendix) a similar question is used, though using the term global warming. Differing terminology and shifting implications is something the reader ought to bear in mind when relating the thesis with the Tandberg study. Furthermore, the Tandberg study relates to climate change and environmental issues in general, while the thesis focus on automobiles and their environmental impact. The environmental impact caused by automobiles can for example consist of release of damaging particles and/or discharge of greenhouse gases.

\[2\] TANDBERG is a global provider of voice-, video-, and data solutions and effective in more than 90 countries (Tandberg, 2008).
6. Results – Profile and perceptions

In this chapter research data will be organized around the three interview segments *Svensk Biogas, users* and *non-users*. The main returning headlines in this chapter are *profile of biogas, perceptions of biogas, division of responsibility, the profile of Svensk Biogas, and perceptions of Svensk Biogas*. In order to make the result visible quotes from the interviewees are presented.

6.1 Svensk Biogas

Below is the result from the focus group interview with Svensk Biogas and their discussion about biogas and their company profile.

6.1.1 Profile of biogas

6.1.1.1 Positive aspects and commitment

The Svensk Biogas participants put forth three main arguments to why motorists ought to commit to biogas. They claimed that biogas was the most *environmentally friendly* fuel, the *least expensive* fuel and furthermore *locally produced*. Biogas was seen as a sustainable solution of a waste problem benefiting the municipality instead of the oil industry. They also stated that in relation to finite resources, biogas is made out of waste and a lasting fraction within society.

In order to reach non biogas users the company used different forms of events. The most successful strategy during these events had been to show a biogas car and possibly a gas tank mouthpiece, in order to practically show and explain how gas-fueling was done. One participant claimed there was a lack of economic resources to actively advertise Svensk Biogas. However, the company had made advertising efforts, such as communicating through local plasma screens in malls and parking lots. They also recalled making radio commercials and a short TV commercial. The company does not send out circular to individuals and as a consequence it is often the motorist who contacts the company, and not vice versa.

Within the group there was also the understanding that once people have committed to a renewable fuel they are more open minded and the possibility for the next generation of cars to make an entrance should be easier. The participant explained it as breaking through fears and uncertainties, furthermore stated that motorists fear renewable fuels will not be available tomorrow, without realizing that there are no guarantees that oil will last.

6.1.1.2 Negative aspects

When people have understood the concept of biogas, the experience in the group was that people do not dislike biogas, stated by one of the participants:

“- *There is no one, at least from my experience, who dislikes biogas, if they know what biogas is. If they do, it is most often misconceptions, [...] with ethanol. They don’t know which is which and has the understanding that you produce biogas out of food [...]”*  
Participant B

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Despite the quote above, the group participants did experience prejudice and arguments against biogas, both outside the company ranging from political boards of directors down to individuals, and at different levels in the company and the parent company. Insufficient infrastructure of filling stations, a short range of the gas tank, and scarcity of biogas cars, were the most frequent arguments mentioned.

Refuting these negative perceptions evolved defeating myth and prejudices, hence trying to change a habit and a certain way of thinking. It was important to influence the motorist to first make an active choice of fuel and then choose a particular car model.

6.1.1.3 Prerequisites of biogas

Political support was seen as the main prerequisite in the context of increasing the demand of biogas. The argument of thinking before acting was brought up, with a correlation to the governmental decision of demanding all major gasoline suppliers to offer an environmental alternative, with the consequence of indirectly supporting ethanol. However, the group participants were aware of the political scale of balance and the difficulty of taking sharp environmental decisions. Even so, they asked for long-term political decisions and the understanding that environmental decisions will demand economic expenses, although it would be beneficial to be proactive instead of waiting. Once political decisions have been taken, the understanding in the group was that motorists would start acting rather immediately.

In the context of the 10 000 SEK subsidiary of eco cars, one argument mentioned was that it most often sponsored economical diesel cars. Furthermore, the subsidy affected a minority of motorists, namely those buying a new car. At the same time, one participant claimed that things were slowly changing, implying that decision makers were becoming more nuanced in their understanding of an eco car and thereby future decision could be more tapering.

The group participants also expressed that the level of knowledge among politicians and public could be improved, furthermore that public campaigns and initiative from influential key figures [nyckelpersoner] might be ways to inform and affect the public.

The discussion concerning scarcity of biogas cars was frequently discussed throughout the interview session. There seemed to be a dissatisfaction regarding the models of available automobiles, in addition, their lack of exposure. One argument was that biogas cars were produced in standard models, the last one in line after other models have been released, and as result had difficulty attracting the whole span of motorists. Performance and exclusivity was thereby neglected and reduced the possibilities for biogas cars to fully penetrate the automobile market. A participant drew parallels to the automobile as a status symbol and people’s desire to drive big luxurious cars, stated by the following quote:

“- In Sweden we are so fixated with gasoline-eating-monsters, and furthermore it is a great deal of status connected to having a car. I think this is particularly true of Sweden”. Participant C

There was also a discussion concerning the car dealers. A participant mentioned a personal reflection of frequently reading the car appendix of the local newspaper and noticing the non existing exposure of biogas cars.
6.1.2 Division of responsibility

The focus group was asked who they consider responsible for reducing motorists’ contribution to global warming. One participant meant it was everyone’s responsibility, another agreed though stated that the government had to direct the public, furthermore make people realize they have a responsibility. The participant gave the example of directing people by economic means of control and the idea of a polluter-pays-principle, stated by the quote below:

“- It’s related to this polluter-pays-principle [...] where you shouldn’t subsidize the clean, but instead impose taxes on what is dirty [...]” Participant A

In order for the government to guide the public, the suggestions were increased tax on gasoline, improved public transportations, and facilitated import of biogas cars and conversion of traditional cars into biogas.

6.1.3 The profile of Svensk Biogas

6.1.3.1 Company values

Prior to the focus group interview, there had been previous discussions concerning qualitative values of the company. When the topic of values was discussed in the focus group, the values of being a sustainable alternative and locally produced was brought up.

During the interview there was also a discussion regarding the company name and there seemed to be a level of opposition. One participant meant that the name of the company [Svensk Biogas] was in conflict with the local approach of the company. Another participant explained that the company used to work nationally and internationally, although today had a more regional profile with filling stations and important customers located in the region. Despite the discussion around the conflicting name of the company, their company message was to contribute to a positive environmental development in the region.

6.1.3.2 Company vision

During the concluding part of the interview the participants were encourage to describe how they would like customers and future customers to perceive the company, in addition to if Svensk Biogas had any underlying vision.

The concepts of trustworthy, environmentally friendly and climate smart [klimatsmart], were the main arguments brought up during this discussion. One participant had a vision of communicating “The right choice” [Rätt val], stating that today there is no fuel more environmentally friendly than biogas. One participant expressed a personal pride and satisfaction driving a biogas car, while another supplemented that this was something they also wished their customers to experience.

Earlier in the interview one of the participants concluded that the time until today had been an initial phase for biogas. During this time biogas had entered the automobile business, a world of engineers building and introducing cars in a certain way. Today, with the price of gasoline constantly increasing, people have started to realize that money can be saved; hence automobile manufactures will most likely start producing trendy and luxurious biogas cars.
Furthermore, a change of generations was mentioned, stating that children of today get environmental education early in school and thereby put pressure on their parents to act environmentally friendly.

6.1.3.3 Logotype

The company logotype (Figure 2) was designed before any of the participants became part of Svensk Biogas.

![Figure 2. The logotype of Svensk Biogas](image)

The logotype was always used in the presentation material of the company. The opinions were somewhat divided concerning the esthetical design of the logotype, in addition, its interpretations. One participant dislikes the logotype and thought it had the shape of the number three [3]. Others were very fond of the logotype and interpreted it as ‘The green way’ [Den gröna vägen]. The dots represented their filling stations and the green curve line indicated the road between them. The curve of the line was meant to give a new experience, as stated below:

“As if you are to go toward the future you also want to have an experience. Driving straight ahead will not give you an experience. Here [showing the green curve line] you have an experience, here you drive toward experiencing something new. [...]” Participant D

In the context of the logotype and profiling the company, the participants had a discussion related to their filling stations. One understanding was that their filling stations could be more noticeable. In comparison to gasoline stations, the biogas stations were small and rather difficult to notice. However, the group also discussed whether or not it would be appropriate for Svensk Biogas to have large colorful signs, since this might conflict with the environmental profile of the company.
6.2 Biogas users

Customers of Svensk Biogas and thereby biogas users, were interviewed and encourage to give their perceptions of biogas and Svensk Biogas. The time-span that interviewees had been committed to biogas varied between one month and four years.

6.2.1 Perceptions of biogas

6.2.1.1 Commitment

Seven out of fourteen interviewees chose biogas because of environmental benefits; others mentioned economic advantages, or, a combination of economic and environmental benefits. Two interviewees used their biogas car as private- and company car, though purchased as a company car and thereby got a lower taxable value.

Eleven of the interviewees were asked if anything specific influenced them into committing to biogas. Environmental influences were again mentioned; hence two interviewees had done research and explored the possibilities before deciding upon committing to biogas, exemplified by the following quote:

“- It is hard to say what influences you, there is so much you hear around you all the time. It was the power of deduction; I made some research and came to the conclusion that this is what I want.” 41 year old woman

Four interviewees referred to their profession, one of them a 37 year old biology teacher:

“- I work as a biology teacher and feel as though I have to live as I preach.” 37 year old man

The quote indicates a personal and professional attachment and furthermore a certain way of living.

6.2.1.2 Positive aspects

A vehicle fuel with low emissions, in addition, using the local resource of organic waste were some of the positive arguments brought about. None of the interviewees mentioned only economic advantages, although used the argument of economy and environment, exemplified by the following statement:

“- [...] it’s better for the environment and also we are commuting every day.” 45 year old woman

6.2.1.3 Negative aspects

The biogas users were encouraged to describe any negative experiences with biogas. Lack of filling stations, and a wish for a better range of the gas tank, was the most frequent opinions among the interviewees.

Two interviewees using the Linköping gas station (one interviewed in Norrköping, though living in Linköping) were unsatisfied with the Linköping filling station because its lack of
service, insufficient compressors, and shortage of gas. In another context one of them mentioned that the gas produced in Linköping was impure, contributing to a great amount of oil in the filter of her car. The interview also claimed that biogas no longer had any strong arguments, based on the rising price of biogas.

One interviewee mentioned that the gas tank took space in the trunk; another claimed his car had less power, although stating that this was not a problem. One interviewee expressed disappointment regarding the misleading media information, stated by the quote below:

“[...] Yes, one thing that is negative is that the information in mass media does not separate biogas. They write all these things about bio-fuels in general, which isn’t true of biogas [...]” 41 year old woman

6.2.1.4 Prerequisites of biogas

In order to have additional motorist shift to biogas, the biogas users believed in increased accessibility of gas filling stations. Furthermore, economic prerequisites such as keeping the gas price down and making the car purchase less expensive, were mentioned and exemplified below:

“- Make sure to keep it on a lower price level and do not raise the price any further. Also make sure to get better service at the filling stations, so that it really works” 41 year old man

A few interviewees suggested marketing, who or how this would be organized was somewhat unclear.

Asking biogas users if they would choose biogas the next time they purchased a car, a majority thought they most likely would. Some of them claimed they would choose the most environmentally friendly alternative at that time, exemplified by the quote:

“- I’m quite positive I will [buy a biogas car]. If there isn’t any hybrid version or so, it ought to be possible to combine a variety of environmental alternatives, electric – biogas instead of biogas – gasoline, it ought to work just as well...” 37 year old man

Five interviewees expressed an uncertainty related to the future development of biogas, in addition, diminishing car supply. Observing the interviewees a majority of them drove Volvo cars, and stated in their interviews that Volvo no longer produces biogas cars.

6.2.2 Division of responsibility

Biogas users were asked who they consider responsible for reducing the motorists’ contribution to global warming; one man chose not to answer the question. The most common argument was that the individual (motorists) had the main responsibility. Others claimed it was a political responsibility and that the government should increase the economic advantages of driving biogas. One woman made parallels to the governmental decision of subsidizing ethanol, as stated below:

“- I guess you could say that it has to do with politicians subsidizing ethanol for example, that isn’t particularly environmentally friendly. They could subsidize biogas more clearly
and direct people toward choosing biogas. [...] I also believe in giving clear eco car bonuses to gas, prior to ethanol cars [...]” 63 year old woman

Additional interviewees saw an alliance of governmental and individual responsibility, some of them implying that the social planning ought to decrease automobile dependence.

6.2.3 Perceptions of Svensk Biogas

During the second half of the interview the biogas users and furthermore customers of Svensk Biogas, were asked to give their perceptions of Svensk Biogas.

6.2.3.1 Contact

The research data is somewhat unspecific regarding the question of how the interviewee first came in contact with Svensk Biogas. The indication is though that a majority contacted the company after buying their biogas car. Some of them pointed out that it was natural to choose Svensk Biogas since they were the only biogas supplier in the region, as stated below:

“- I guess it was when I bought this car. And then it’s Svensk Biogas who has these filling stations, the one that offers biogas in Linköping.” 44 year old man

Two interviewees were connected to the Tekniska Verken group and thereby knew of Svensk Biogas. One of them recalled getting a Svensk Biogas brochure sent to her house after purchasing her car. Another woman got information about the filling stations in Norrköping by her car dealer. By using the filling stations and observing the company name she realized she was a customer of Svensk Biogas. A male interviewee recalled having his first contact with the company at an eco car event held in Norrköping a few years ago.

6.2.3.2 Perceptions of the company

The majority expressed a positive understanding of Svensk Biogas; some put forth the positive regional development of biogas, one of them quoted below:

“- They have done quite a good job in the region with increasing... it’s not going very fast though... Biogas struggles in head wind and E85 has wind in the sails. So I guess they’ve done a pretty good job with getting it out there as much as possible.” 44 year old man

Four interviewees were unhappy with the quality of the Svensk Biogas filling stations, while another thought they could lower their price of gas.

A few interviewees expressed modest contact with the company and therefore found it hard to reveal a standpoint.

6.2.3.3 Information

The majority of interviewees were satisfied with the information obtained by the company; some had requested brochures, while others kept themselves updated by reading the company homepage. One interviewee recalled being informed about the particular gas filling station in Linköping and its lack of gas during afternoons. Another interviewee obtained company
information by reading the local newspaper, which had written quite a lot about biogas and Svensk Biogas were often involved in the debate section.

Two interviewees suggested distributing additional information; one thought Svensk Biogas could send out a map showing all gas station in Sweden, another gave the idea of handing out stickers and postcards.

6.2.3.4 Negative aspects

A majority of interviewees were asked if they had any negative perceptions of the company. Once more, dissatisfactions regarding the filling stations were brought up, however two interviewees referred to lack of gas in Stockholm and Mariestad, geographic locations beyond the effective regions of Svensk Biogas. One man also wished for additional filling stations, arguing that the present three in Norrköping were insufficient.

A number of interviewees had a particular Svensk Biogas filling-card, while others did not. A woman who did not use this particular filling-card expressed an interest to be informed on how to obtain one.

6.2.4 Addendum

The last question of the interview gave the interviewee an opportunity to supplement their perception of biogas and Svensk Biogas. Nine of them had nothing to supplement, while two were unsatisfied with the increased price on biogas.

One interviewee wanted the myths of biogas to be killed, argued that people thought it was explosive, difficult to fuel, the same as ethanol, and very expensive. In addition, she wished car dealers should be influenced into exposing their biogas cars, exemplified by the quote below:

““- When I get advertisement from Fiat and Volksvagen it is not very clear that they offer biogas cars. [...]” 41 year old woman

During the concluding question one interviewee expressed her satisfaction with driving a biogas car:

““- We are very pleased with having bought a biogas car, and regarding the filling stations [lack of them]; it is okay as it is today” 34 year old woman
6.3 Non-users

Non biogas users were interviewed regarding their perceptions of biogas and Svensk Biogas. 24 interviewees filled their cars with octane gasoline, two with diesel, while two preferred ethanol.

6.3.1 Perceptions of biogas

The research data indicated four different categories of perception: positive, uninformed, ambivalent and negative.

Positive

Fourteen interviewees had an overall positive perception of biogas. The argumentation of their standpoint was somewhat vague, although a few emphasized biogas’ environmental benefits. In spite of their positive attitude the majority expressed some level of uncertainty, mostly regarding a lack of gas filling stations, below is an example of this uncertainty:

“- I think it’s rather good, although there is a lack of availability, however it’s starting to increase more and more, and soon it will be a good alternative” 42 year old man

Two interviewees mentioned the high prizing of biogas cars, while another two put forth the difficulty of fully replacing gasoline, exemplified by the following quote:

“- Yes, I guess it’s good [biogas], but the way I understand; it cannot fully replace gasoline, it is only one of many means, if we are to replace [Oil]...” 29 year old man

The above quote manifests an uncertainty regarding biogas and also enlightens the context of finite- versus renewable fuels.

Uninformed

Ten interviewees expressed none or modest awareness of biogas, one of them stating that she had not given it much attention, exemplified by the quote below:

“- No... I haven’t thought too much about it, I haven’t had the time to. Since you have children you don’t have the time to think so much.” 23 year old woman

Within this category, three interviewees were uniformed in the sense that they seemed to mix up biogas with ethanol, or bio-fuels in general. The following quote in an example of this misconception:

“- Biogas can be a variety of things, isn’t it so? I think it is devastating, if I understood it correctly and am not mistaken. It is horrible that they are growing wheat and maize in order to make fuel. This might be what they make ethanol of, am I mixing it up...?” 49 year old woman

Ambivalent

Three interviewees were ambivalent concerning their perception of biogas. On the one hand they saw biogas’ environmental contributions, on the other they referred to the ongoing fuel-debate and found it hard to discern right from wrong, as stated in the following quote:
“- I guess it is better for the environment, but at the same time we have this new arising debate concerning whether or not we use our resources in nature to grow plants in order to produce biogas.” 24 year old female

A 44 year old male fueling his car with ethanol had an ambivalent understanding of biogas, exemplified by the following interview dialog:

**Interviewee:** “- [...] You get mixed messages I believe. You try to do something, but it is hard to know what’s right.”
**Interviewer:** “- What kind of messages have you gotten?”
**Interviewee:** “- Well this thing about the sugar plants in Brazil... It is mostly that you get the feeling of what is right?”

The statement signals a willingness to make an environmental contribution; it is although possible that the interviewee has aligned biogas with ethanol.

**Negative**
One interviewee did not believe in biogas, exemplified by quote below:

“- I do not believe in biogas, in a long-term perspective. [...] I believe it is way too expensive to produce, devastation of crops and such. I most definitely believe that hybrid cars are the future.” 63 year old man

The man stated a negative perception of biogas; however the quote implies that the interviewee might have mixed up biogas with ethanol, or bio-fuels in general.

6.3.1.1 Possible commitment and prerequisites of biogas

The interviewees were asked if they could consider purchasing a biogas car. All, except one, were positive; the interviewee in the above negative category could not see this happening, at least not for the time being.

The interviewees were then encouraged to describe the prerequisites needed in order for the purchase to occur. The most common argument was to increase the number of gas filling stations and making biogas accessible and convenient. Below is the perception of an interviewee committed to ethanol:

“- When you know there is [gas filling stations] [...] I would consider a biogas car instead of an ethanol car, because I think it’s better with biogas.” 44 year old man

Another returning argument was economic conditions, often connected to having the money to purchase a new car. Interviewees also mentioned that biogas might be considered when it is time to change car. Below is the quote of an interviewee driving a diesel car although desired to drive a biogas- or eco car, exemplified by the following quote:

“- [...] At the moment it’s only a financial question. I would much rather drive an eco car, it’s only a matter of lack of money.” 25 year old woman

A few interviewees expressed a lack of knowledge; although mentioned that if biogas turned out to be economical favorable, it might become a future commitment.
6.3.1.2 Commitment to gasoline

Non-customers were asked to give their understanding of why they thought the majority of motorists chose gasoline.

The most frequent arguments were connected to economical- in addition to behaviour aspects. The interviewees claimed that it was expensive to purchase biogas/eco cars and also that shifting to biogas was connected to, not only purchasing a biogas car, but more importantly buying a car, demanding economic means and the prerequisite of buying a car, exemplified by the quote below:

“First and foremost because you haven’t had the money to change car ... it demands a big investment in the form of a new car. That is at least my greatest cause.” 24 year old woman

The behavioral aspects involved arguments concerning that using gasoline is convenient and more or less a habit, exemplified by the following quote:

“An old habit in a routine manner so to speak, all that is considered new is hard in the beginning... ” 65 year old man

The great availability of gasoline stations, scarcity of biogas/eco cars, and lack of knowledge, were additional arguments among the interviewees.

6.3.2 Division of responsibility

The interviewees were asked who they consider responsible for reducing the motorists’ contribution to global warming. The arguments within the research data were challenging to distinguish and separate since they often aligned into one another, furthermore interviewees mention that everyone was responsible, without specifying its implication.

The three main arguments were that individuals/the public, politicians (government and municipality), or, a combination of the two, obtained the main responsibility. Some of the interviewees thought that the government ought to direct the people, exemplified by the following quote:

“[...] that they [the government] decide upon what alternative they prefer, and then set the taxes based on this decision.” 37 year old man

Interviewees also brought up how we use the car, suggesting that motorists should optimize the utilization, by for example driving less, eco-drive, and use public transportation, below are an example of this standpoint:

“It’s everyone’s responsibility to think about how we drive and foremost one can choose how to use the car. For example how much do I use it, and how do I drive the times I have to use the car?” 34 year old woman

Two interviewees arguing for a common division of responsibility (politicians and individuals), expressed a need of information, exemplified by following the quote:
“... The problem is how to reach and influence each and every individual, it’s all about making everyone realizing.” 24 year old woman

A few interviewees had the opinion that big oil consumers such as: large industries, oil companies, aircrafts, and trucking companies ought to be at focus in the context of dividing the responsibility.

6.3.3 Perceptions of Svensk Biogas

The non biogas users were exposed to the Svensk Biogas logotype (modified, not showing the company name) and asked to identify the logotype. The research data indicated five categories of identification: no recognition, recognition, identified biogas, identified Svensk Biogas and mistaken (Table 4).

Table 4. Identification of the Svensk Biogas logotype

<table>
<thead>
<tr>
<th>Identifying Category</th>
<th>Number of Interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>No recognition</td>
<td>17 interviewees (8 Linköping and 9 Norrköping)</td>
</tr>
<tr>
<td>Recognition</td>
<td>4 interviewees (2 Linköping and 2 Norrköping)</td>
</tr>
<tr>
<td>Identified biogas</td>
<td>4 interviewees (2 Linköping and 2 Norrköping)</td>
</tr>
<tr>
<td>Identified Svensk Biogas</td>
<td>2 interviewees (1 Linköping and 1 Norrköping)</td>
</tr>
<tr>
<td>Mistaken</td>
<td>1 interviewee (Linköping)</td>
</tr>
</tbody>
</table>

**No Recognition**

Interviewees at this level had no recognition of the logotype. By revealing Svensk Biogas and asking if they knew of the company the majority claimed to have no knowledge, others recalled seeing the logotype on vehicles and production facilities. A few recalled getting some form of information or advertisement, although without reading it. Others knew of Svensk Biogas production facilities in Linköping and Norrköping.

**Recognition**

Interviewees at this level had seen the logotype, though uncertain of its context. One male expressed that he had seen it on taxi-cars and public buses. When the interviewer confirmed that it was Svensk Biogas four interviewees expressed modest knowledge, although remembered seeing the logotype, had heard or read about the company, or obtained some form of advertisement.

**Identified Biogas**

Four interviewees correlated the logotype to biogas, though somewhat hesitant. One man had visited the facilities of Svensk Biogas and expressed a positive perception of the company. Two Linköping interviewees knew about their filling stations, one of them suggested the company could market itself by mailing out a brochure.
**Identified Svensk Biogas**

Two interviewees correlated the logotype to Svensk Biogas although one of them expressed that he had a business relationship with the company. The other interviewee had seen the logotype on gas filling stations and flags.

**Mistaken**

One interviewee associated the logotype with a logotype of ethanol.

### 6.3.4 Addendum

The last interview question gave the interviewee an opportunity to supplement their perception of biogas and Svensk Biogas. Twelve of the interviewees had nothing to add, while the remaining interviewees brought up comments mostly connected to biogas in general and repeated what already had been said. Three interviewees within the no recognition category ended their interviews by suggesting more information, as stated by the quote below:

“ [...] I think it would be helpful if there was more information about it. So that we lazy people [...] For example where you can buy these sorts of cars and how it works. That is what I think is needed.” 42 year old woman
7. Analytic discussion – Comparing key findings

In this chapter key finding from the research data of the three interviewee segments will be analyzed and compared in order to identify patterns, similarities and differences. The analytic discussion will focus on profile and perceptions of biogas, division of responsibility and profile and perceptions of Svensk Biogas.

7.1 Profile and perceptions of biogas

7.1.1 The commitment

Svensk Biogas gave three arguments to why motorists should commit to biogas, stating that it was the most environmentally friendly fuel, the least expensive fuel and locally produced. According to biogas users, the majority committed to biogas because of environmental benefits, for example arguing that biogas had low emissions of greenhouse gases and derived from a local renewable resource. Economic advantages were also mentioned, such as a lower taxable value and the lower price of biogas. Environmental benefits seemed to be the most common argument and economic advantages was seldom the determining factor behind their commitment.

Svensk Biogas and their users have a similar understanding of biogas, possibly since they are both committed to biogas. It is unclear whether or not the three arguments used by Svensk Biogas have equal importance. If so, it does not correlate to the users, stating environmental benefits as the most important, while its lower price got less attention; some interviewees even expressed a disappointment regarding the increased price of biogas.

Non biogas users had an overall positive perception of biogas, although there seemed to be a lack of knowledge about biogas and it appeared as though motorists rather wait and see. The main arguments to why a majority of motorists chose gasoline were the habit and convenience of using gasoline; furthermore the high investment cost of a car and particularly a biogas-eco car. The positive standpoint toward biogas was something that was discussed in the focus group of Svensk Biogas, arguing that motorists seldom dislike biogas. This conclusion is in line with the Ulmer et al. (2004) research stating that the residents of Oklahoma had a positive understanding of a reintroduction of ethanol. The non-biogas users, in line with the prospective ethanol users, have a positive perception of their particular renewable fuel (Ulmer et al., 2004). The argument that economic aspects are determining factors for non-users is also in resemblance with the Oklahoman research (Ulmer et al., 2004). In this study cost was the main parameter to whether or not the residents would commit to ethanol. This concludes that motorists are positive toward renewable fuels. However, profiling and presenting environmental benefits of renewable fuels is somewhat insufficient, since uncommitted motorist are driven by economical benefits.

The apparent difference between biogas users and non-users is that biogas users are driven by environmental benefits, while non-users are driven by costs and convenience. One explanation might be that biogas users and non-users are within different consumer categories. Coddington (1993) distinguishes five categories, where biogas users would fit into the first two, the true-blue greens representing the most engaged consumers, and the greenback greens customers, prepared to pay a little extra in order to attain green products. In relation, non-users are represented mainly in the third category, the sprout, being somewhat
concerned though without taking action (Coddington, 1993). Biogas users and non-users are only one or two categories apart, implying that non-users express environmental concern and are therefore not part of the least engaged consumer categories mentioned by Coddington.

Different levels of commitment can also be put in the light of the Haanpää (2007) research, concluding that environmental consumerism is determined by lifestyle. One of the differences between biogas users and non-users is that biogas users have made a deliberate choice of fuel. They chose biogas because of certain qualities, while non-users were more or less committed to gasoline because of a routine behavior. Biogas users argued that selecting biogas was in line with their profession and willingness to make an environmental contribution. Scrutinizing the research data, hence placing it in relation to the conclusion of Haanpää (2007), biogas users and non-users have different lifestyles, where biogas users’ environmental consumption is part of their green lifestyle.

A majority of biogas users had the understanding that they would remain committed to biogas, or, choose the most environmental alternative at that time. This standpoint corresponds to the understanding among Svensk Biogas, stating that once motorist have committed to an alternative fuel they are more open minded toward the next generation of automobiles. Non-users were positive toward a future commitment to biogas, although today experienced barriers such as lack of filling stations and lack of personal economic means. These barriers are in line with Romm (2005), stating that cars driven on renewable fuels throughout the years have experienced certain barriers. Two of the barriers stated by Romm correspond to the barriers mentioned by non-users, lack of filling stations, and a high investment cost of the vehicle. The Romm research comprises all alternative fuel based vehicles, while this thesis only focuses on biogas. It is therefore possible that in the context of biogas and the context of today, lack of filling stations and a high investment cost of the car, are the two determining barriers of biogas according to non-biogas users.

According to theories explaining how people are persuaded by communication a majority of theories follow the information processing order of knowledge – attitude – action. However, some researchers believe in a less rational individual influenced by his or her social context, and bringing about a modified persuasion process (Larsson, 2001). Based on the research data, the impression is that knowledge and attitude are two determining factors to persuade motorist into a biogas commitment. When motorist increase their level of knowledge, or change a certain way of thinking, change of behavior can be possible. It is difficult to determine whether knowledge, or, attitude starts the persuading process, or if they happen simultaneously, furthermore if these are determining factors for all motorist.

Svensk Biogas would like biogas users to experience a feeling of satisfaction. This emotion correlates to the persuasion formula of AIDA(S) attention-interest-desire-action and later on supplemented with satisfaction (Larsson, 2001). Similar statements returned among biogas users and interviewees expressed being pleased with their commitment and that it was part of their lifestyle. Others expressed satisfaction in the sense that they would remain committed to biogas. In contrast, non biogas users had displayed attention and interest and at times desired to shift to biogas. Furthermore, it might not be possible for all non-users to experience the feeling of satisfaction connected to biogas. If economic means is a determining factor for non-users commitment to biogas, it is possible to draw the conclusion that age and socio-economic background is connected. None of the biogas users were under the age of 29, while the youngest gasoline user was 23, presumably not having the same economic buffer. A 25-year-old woman desiring to drive a biogas car fueled diesel because she did not have the money to
shift to biogas. This conclusion is somewhat in line with the research by Haanpää (2007), stating that environmental behavior is determined by lifestyle not socio-economic background. I am willing to agree, although I would like to add that environmental consumerism demands economic preconditions. Even if one has personal desire and attachment, the desire might not incorporate until one has a certain level of monetary support.

7.1.2 Negative aspects

According to Svensk Biogas, the most common negative perceptions connected to biogas received by stakeholders both inside and outside the company were: insufficient infrastructure of filling stations, a short range of the tank, and scarcity of biogas cars. This was quite similar to the biogas users, stating lack of filling stations, and a short range of the tank, as the two most common negative arguments. Scarcity of biogas car was not mentioned by the biogas users, although mentioned in the context of the future development of biogas, discussed in the section Prerequisite of biogas below.

Svensk Biogas and biogas users brought up more or less the same arguments, which imply that Svensk Biogas is aware of the negative perceptions connected to their product. If Svensk Biogas is aware of this the question is whether or not they have done anything to improve the situation. However, scrutinizing the two arguments: lack of filling stations and short range of the tank, it is clear that these problems should be dealt with by different stakeholders, not Svensk Biogas alone. For example, lack of filling stations is possibly a matter that ought to be of national concern, while shortage of the gas tank is something for the automobile business to redesign.

Svensk Biogas mentioned that when refuting negative perceptions of biogas, they exemplified it as defeating myths and prejudices. This argument was also stated by a biogas user, arguing that she experienced immense biased information concerning her choice of fuel. Comments about misunderstandings of biogas returned in all three interview segments. Non-users expressed a lack of knowledge concerning biogas and had a tendency of bringing biogas in line with ethanol and bio-fuels in general. According to both biogas users and non-users the present debate in media was the source of information connected to this misapprehension. The “information” barrier is not present in neither the ethanol-study (Ulmer et al., 2004), nor the Romm (2005) article. One explanation might be the current media debate concerning automobile fuels and the fact that the Romm and the Ulmer el al. research were published three and four years ago in the USA with a different media context. Another conclusion is that information (lack of information and misleading information) is a barrier of biogas, and should be added to list of barriers connected to alternative fuel based vehicles mentioned by Romm (2005).

7.1.3 Prerequisites of biogas

In order to create prerequisites and increase the demand of biogas, Svensk Biogas believed in long-term political decisions and the understanding that environmental decisions will demand economic expenses; however it would be beneficial for politicians to be proactive.

Biogas users were given a different approach to the same topic and asked what they thought was required in order to have non-users shift to biogas. The main arguments mentioned were to increase the number of filling stations, in addition, economic prerequisites such as keeping the biogas price down and making the car purchase less expensive. These arguments were
quite similar to the once mentioned by non-users. A reduced price of fueling biogas was not mentioned among non-users, although a few non-users expressed that if biogas turned out to be economically favorable, it might become a future commitment.

Svensk Biogas was unsatisfied with the scarcity of biogas cars, a topic returning among biogas users. Biogas users expressed an uncertainty related to diminishing car supply and the fact that Volvo no longer produces biogas cars. Svensk Biogas, in addition to a biogas user thought car dealers ought to better expose and market their biogas cars. The argument of scarcity of cars was not a barrier mentioned by Romm (2005) and should therefore be added to list of barriers connected to alternative fuel based vehicles.

Company and biogas users/non-users appear to have different focus upon the prerequisites of biogas. Svensk Biogas mentioned political support in addition to scarcity of cars, while biogas users and non-users mentioned lack of filling stations and economic prerequisites. A possible explanation is that Svensk Biogas is depending on the prerequisite of political decisions, while motorist have focus on practical issues such as accessibility of filling stations and their private economy.

As mentioned earlier, information was another argument brought up, although not as widespread as the arguments above. Svensk Biogas desired to improve the level of knowledge among politicians and the public and gave suggestions of campaigns and initiative from influential key figures [nyckelpersoner]. A few biogas users suggested marketing as a way of committing additional biogas users. The argument of information was also present among non-users, asking for information in order to gain knowledge about biogas. Information can appear diffuse and both biogas users and non-users were rather unspecific when explaining how the communicating aspects ought to be accomplished. In the context of perception, the understanding of biogas is related to the individual selection, organization and encoding of information (Dimbleby & Burton, 1998). The mental awareness is also determined by personal knowledge and believes (Dimbleby & Burton, 1998). Prior understandings in the form of misconceptions and prejudice have been discussed in the section of Negative aspects. Even so, it is appropriate to add that the way people perceive biogas is related to prior knowledge and believes and that penetrating these prejudices, as stated by Svensk Biogas and biogas users, is significant.

7.2 Division of responsibility

The answers to the question of who the three interview segments considered responsible to reduce motorists’ contribution to global warming, was somewhat difficult to analyze. In addition, global warming, as mentioned earlier in the thesis, can easily be mixed up with climate change or environmental issues in general, especially among the general public. It is important to clarify that this interview question related to automobiles contribution to global warming, not emission of particles.

According to Svensk Biogas the responsibility rested upon each and everyone, although political decisions ought to direct the public, hence guide them toward choosing environmentally friendly alternatives. The most common argument among biogas users was that the responsibility lay upon the individual, while some argued that the government should increase the economic advantages of using biogas. Non-users had the understanding that individuals and/or politicians had the main responsibility.
According to the Tandberg study (2007), individuals thought that international governments ought to take the responsibility of limiting the effects of climate change and that this could be done by imposing governmental policies and subsidies. In the thesis, the argument that politicians ought to direct the public was an opinion returning throughout the three interview segments. However, biogas users mainly believed in an individual responsibility. An explanation to this standpoint might be that by committing to biogas, the biogas users have taken a personal responsibility against increased emission of greenhouse gases.

A difference between Svensk Biogas and users/non-users was that Svensk Biogas oppose subsidizes and instead wished for increased tax on gasoline. In relation, biogas users and non-users were favorable of subsidizes, in addition to reduced tax on biogas. In a way the company and users/non-users are implying the same, although having different perspectives.

7.3 Profile and perceptions of Svensk Biogas

7.3.1 The profile of Svensk Biogas

In the group discussion of the company values there seemed to be a contradiction between values and the company name. Some meant that the value of being local was in conflict with the company name and its national interpretation. Despite this discussion, it was important for Svensk Biogas to contribute to a positive environmental development in the region. Svensk Biogas stated that today biogas is the most environmentally friendly fuel available. They also expressed a pride and satisfaction related to their product, something they also wished their customers to experience.

A company profile is meant to be deliberately developed and communicate company values, with the intentions of obtaining certain goals and leave an impression with the customer (Heide, 2005). Based on the research data the profile of Svensk Biogas could be more deliberate and specific. When asking Svensk Biogas to state their company values the discussion became rather hesitant, however, sustainable alternative and locally produced were mentioned. In another context of the interview Svensk Biogas were asked how they would like to be perceived, and mentioned trustworthy, environmentally friendly and climate smart [klimatsmart]. Even if all the above concepts have similar meaning, and the fact that the concepts were stated in two different interview questions, it signals that Svensk Biogas ought to discuss their company profile. The idea of the profile is according to Larsson (2001) that it should be produced within the company and communicated to targeted stakeholder. According to Larsson (2001) the profile of a company represents how the company aspires to be perceived. Based on the research data Svensk Biogas is hesitant regarding how they wish to be perceived, which could result in an indistinct profile bringing about a misleading public perception.

7.3.2 Profiling Svensk Biogas

Svensk Biogas is a subsidiary to the Tekniska Verken group owned by the municipality of Linköping. According to Svensk Biogas there are not enough economical resources to actively market the company. When profiling the company and their product they used different forms of events and exposure on local plasma screens, they also mentioned having used radio- and TV commercials. Based on comments stated among the interviewees, I would like to supplement that Svensk Biogas uses additional profiling material, such as an internet
homepage, brochures, in addition, use their logotype on a variety of objects. (The logotype of the company will be discussed in the section below). It is possible that further material is available, however the thesis will only comment on those stated in the research data.

Svensk Biogas does not send out circulars to the public and thereby it is most often the customers taking the initiative to contact the company. This statement correlated to the fact that a majority of biogas users contacted the company after buying their biogas car. Biogas users also stated that because Svensk Biogas is the major biogas producer in the region it was not relevant to compare Svensk Biogas with comparative producers. The biogas users were satisfied with the information obtained by Svensk Biogas. Some had requested brochures, while others kept themselves informed by reading the company homepage. The events mentioned by Svensk Biogas were only referred to by one biogas user. A possible presumption is that the events did not target private motorists, or if they did, motorists did not give them attention. If the latter is accurate, it is advisable for Svensk Biogas to increase the exposure and profiling of these events.

7.3.3 Logotype

Profiling a company is often related to graphic communication of form and shape (Heide, 1996). In the context of studying the profile and profiling of Svensk Biogas the company logotype was put at focus.

The logotype of Svensk Biogas (see Figure 2) is always included in the presentation material of the company. According to non-users the logotype could also be found on for example gas filling stations, flags, public buses and taxis. In the context of using the logotype and profiling the company, one understanding within Svensk Biogas was that their filling stations could be more noticeable. The discussion also involved whether or not it would be appropriate for Svensk Biogas to have large colorful signs since this type of profiling might contradict with their environmental profile. This statement is an implication of an underlying company profile; however as discussed earlier in the thesis, the profile ought to be planned and deliberately used.

Svensk Biogas had different opinions concerning the esthetical design of the logotype and its interpretations. A majority of the participants were fond of the logotype interpreting it as “The green way” [Den gröna vägen]. The three dots represented the filling stations and the green curve line distinguished the road between them. Furthermore, the green concave line indicated a new experience, the experience of biogas. The intention of having a logotype that communicates certain values (Holger & Holmberg, 2002), and furthermore is an adequate representation of the company, was manifested in the group interpretations of the logotype. The interpretation of “The green way” is in line with the earlier discussed environmental values of the company.

To determine if motorists had given attention to the logotype and Svensk Biogas, non-users were exposed to the logotype (modified, not showing the company name). A majority of them did not recognize the logotype, while others recalled seeing it, though uncertain of its origin. They seemed to have modest understanding of the company; some recalled obtaining information or advertisement, though without reading it, others knew of the filling stations and their production facilities of Svensk Biogas.
A logotype is intended to give associations to a specific company, hence represent its imbedded values (Holger & Holmberg, 2002). Based on the research data, a majority of non biogas users were unable to correlate the logotype with Svensk Biogas. One explanation might be that the logotype was modified and showed on an A4 paper and thereby taken out of its context. Another explanation is that non-users, as stated earlier, lack knowledge of biogas and thereby had not paid attention to the logotype of a biogas company. Attaining the attention of motorists, whether it is by logotype or other means, is of importance. As earlier discussed in the thesis *attention* is the starting piece in order to persuade people (Larsson, 2001). It is therefore advisable for Svensk Biogas and other biogas producers, to increase the exposure of their logotypes and use it more deliberately in their profiling efforts. By making motorists aware of biogas and giving biogas further attention the process of committing to biogas is initiated.

### 7.3.4 Perceptions of Svensk Biogas

According to the research data there was no decisive difference between perceptions among interviewees in Linköping and Norrköping (except for arguments related to the filling station in Linköping, commented below). One explanation might be that people are commuting between the two cities, or, have similar perceptions since the cities are only 45 kilometers apart.

Biogas users had an overall positive perception of Svensk Biogas; however their arguments were rather unspecific and it seemed as though they did not have a personal relationship to the company. As earlier mentioned, some stated that Svensk Biogas had performed a good job expanding biogas in the region of Östergötland. Non-users had modest awareness of the company. They recalled getting information though without reading it, a few knew of the filling stations and production facilities of Svensk Biogas. Some non-users expressed a willingness to be informed, not only about Svensk Biogas but about biogas in general.

The increased price of biogas was one of the negative arguments brought about by biogas users. However, the most common argument was related to the quality of the gas filling stations, in particular the filling station at the Linköping interview location. The dissatisfaction was connected to the lack of service, insufficient compressors, and a shortage of gas. According to the company, although not stated in their interview, this particular filling station will be improved. Lack of biogas was also mentioned in the context of filling stations in Stockholm and Mariestad. This particular issue is something for the whole biogas business to investigate. Apparently it aggravates biogas users and thereby contributes to a harmed relationship between biogas producers and users. In order to shift from finite- to renewable automobile fuels a good relationship between biogas producers and users is essential.

### 7.3.5 Correlation of profile and perceptions

The idea is that profile and perception can be placed on equal footing; hence that customer perception is equal to the intended company profile (Larsson, 2001). Svensk Biogas would like motorists to commit to biogas due to the fact that biogas is the most *environmentally friendly* fuel, the *least expensive* fuel and *locally produced*. The thesis has interpreted these three arguments as the profile of biogas.

Environmental benefits were the main arguments to why biogas users had committed to biogas, stating its low emissions and local origin. The profile and perception of biogas,
between biogas producer and their users are rather similar; however communicating that biogas is the least expensive fuel could be improved, in order to close the gap between profile and perception. To communicate the economic benefits of biogas, the actual biogas price ought to be investigated. According to interviewees the price on biogas could be reduced, or the price of gasoline could increase, depending on the perspective.

The profile and perception of biogas between biogas producers and non-users are further apart. Some non-users have acknowledged biogas environmental benefits, though without giving attention to the fact that biogas is the least expensive fuel available. In order to place non-users perception on equality with the producer understanding of biogas the key-word is attention. This could be done by deliberately profiling biogas and other renewable fuels, furthermore have non-users attain the matter attention by for example economic means of control and information.

According to Svensk Biogas the company stands for the values of sustainable alternative and locally produced. They also would like customers and future customers to perceive the company as trustworthy and environmentally friendly and climate smart [klimatsmart]. The thesis has brought together the company values and vision and interpreted the arguments as the company profile.

The majority of biogas users had a positive perception of Svensk Biogas. Biogas users also claimed that they did not have a personal relationship to the company. The profile of biogas (the most environmentally friendly fuel, the least expensive fuel, and locally produced.) and the company profile (sustainable alternative, locally produced, trustworthy, environmentally friendly and climate smart) was quite similar and seemed to focus on both product and company. At times users and non-users aligned their perception of biogas with Svensk Biogas. In the light of profiling and company brands Heide (1996) argue that product brand at times equals corporate brand, giving the examples of coca-cola (company and product) and Volvo (company and product). In one sense Svensk Biogas is the product, though with modification. Svensk Biogas is biogas, although biogas is not only Svensk Biogas. However, in Östergötland biogas has been equal to Svensk Biogas since they have been the only producer for a long time. Today, competing biogas companies are entering the market and it is becoming increasingly important for Svensk Biogas to possess comparative advantages.

Based on the research data, my discovery is that non-users are uninformed of Svensk Biogas simply because they are uninformed of biogas. In the context of theories related to the way people are persuaded by communication (Larsson, 2001) the formula AIDA(S) signifies that users and non-users have different relationships to biogas and Svensk Biogas. Attention is sometimes divided into two, opening- and continuing attention where it is only possible to persuade individuals obtaining a continuing attention (Larsson, 2001). It might be possible that non-users have an opening attention, although as mentioned earlier, if they are to be persuaded into shifting to biogas they have to start acknowledging biogas.

In order to strengthen the perceptions of biogas among motorists, it is advisable to strengthen the profile of biogas. The barriers connected to vehicles driven on alternative fuels mentioned by Romm (2005) can also be found in this thesis. Limited fuel stations, a short range of the tank, a high investment cost, are the main corresponding barriers found in the two studies. If the profile of biogas is to be improved these barriers can no longer be neglected. According to the thesis and stated in Tandberg (2007), the governmental responsibility have to be improved. Guidance is one of the means exemplified among biogas producer and motorists,
who ask for long-term political decisions and that environmental consumption ought to be economically beneficial. These prerequisites will contribute, not only to a positive perception of biogas, but a change of behavior with motorists starting to commit to renewable automobile fuels.
8. Concluding discussion

In this chapter research conclusions will be discussed in relation to the intended aim of this thesis. The conclusion will be analyzed in the context of having motorists shifting from finite-to renewable automobile fuels.

8.1 Thesis aim and research conclusions

The aim of the thesis has been to explore the profile of biogas in relation to its perceptions, focusing on the communication between Svensk Biogas and their biogas users and non biogas users. Henceforward there will be a concluding review of each stated research question.

- What is the profile of biogas and Svensk Biogas, and how is the company profile communicated to users and non-users?

The thesis concludes that the profiling arguments of biogas correlates to fact that biogas is the most environmentally friendly fuel, the least expensive fuel, and locally produced. Furthermore, that the company profile of Svensk Biogas is equal to sustainable alternative, locally produced, trustworthy, environmentally friendly and climate smart [klimatsmart]. Given the arguments of the company profile, environmental values is the core communicating value. Profiling Svensk Biogas happens through events and by using communication material such as a company logotype. The logotype is in line with the environmental values of the company.

- What are the perceptions of biogas and Svensk Biogas among users and non-users?

Perception is the process through which people comprehend their surrounding world (Dimbleby & Burton, 1998). The perception of biogas is not only connected to a particular biogas producer nor biogas as an isolated object, instead, motorists perceive biogas surrounded by a blend of influencing signals, such as the media debate, lifestyle, and socio-economic background.

In line with Ulmer et al. (2004) and the study of public perception of ethanol, this thesis concludes that motorists have an overall positive perception of biogas. Biogas users states environmental benefits as the key argument behind their commitment. According to motorists the negative perceptions, in addition to the prerequisites of biogas, are connected to insufficient infrastructure of biogas filling stations, a short range of the biogas tank, a high investment cost of a biogas car, an increased price of biogas, scarcity of cars, in addition, lack of information and misleading information. Three of these barriers correspond to barriers connected to vehicles driven on alternative automobile fuels (Romm, 2005). Romm, states six barriers applicable on a variety of automobiles, while the thesis concludes the specific barriers of biogas. Furthermore, the thesis concludes the additional barriers information (lack of information and misleading information), and scarcity of biogas cars. Romm (2005) refers to a chicken and egg problem related to the lack of filling stations. In the light of the thesis the question should be - who will produce biogas cars if there are no filling stations, and who will install filling stations if there are no available automobiles? Based upon this dilemma, one might become concerned with the future development of biogas since producer, users and non-users mention scarcity of biogas cars, exemplified by Volvo and the fact that they no longer produce biogas cars. Volvo, on the other hand blame the government’s decision to
subsidize ethanol and the fact that motorist do not request biogas (Wallner, 2008). If automobile manufacturers are driven by political decisions, then political decisions ought to be the decisive factors. Political responsibility is mentioned in the thesis, in addition, the Tandberg (2007) study, both stating that international governments ought to lead the way.

Non-users are positive toward biogas, although expressing a lack of knowledge. This conclusion can also be found in the international Tandberg (2007) research, stating that individuals are concerned about the environment and embrace green products, though without making personal environmental contributions. Based upon this argument there is a need of engaging people and as stated by the biogas producer, make people realize that they have a responsibility. The most successful way of bringing about engagement and a change of behavior is political action, exemplified by economic means of control with long-term political decisions based upon environmental values, directing both producers and motorists.

The overall perception of Svensk Biogas among biogas users is positive and they are content with the information obtained by the company. The biogas users express a negative perception concerning the Svensk Biogas filling stations and also wish the biogas producer could lower the biogas price. Non-users express modest perceptions of the company. The main conclusion is that perceptions of the biogas producer are correlated to the perceptions of biogas, and the understanding that producers of renewable fuels are more or less the product.

- Does the profile of biogas resemble the perceptions of biogas among users and non-users?

The profile of biogas (the most environmentally friendly-, and least expensive fuel, and locally produced) is rather similar to the perceptions among biogas users; however the economical benefits of biogas got less attention among the users. The profile and perception between producers and non-users are further apart and non-users seem to confuse biogas with ethanol and bio-fuels in general. Some non-users have acknowledged biogas environmental benefits and regional origin, without attention to that it is the most environmentally friendly- and the least expensive fuel.

- Does the company profile of Svensk Biogas resemble the perceptions among users and non-users?

The profile of the company resembles how biogas users perceive the company quite well. As mentioned earlier, the tendency to align producer and product is thought noteworthy. This might not be negative, although something to bear in mind when studying the profile of renewable fuel companies. Instead of strengthening the company profile it might be more successful to improve the profile of the product.

The non-user perception in relation to the company profile is rather far apart and at times contradicting each other based upon the fact that non-users mix up biogas with ethanol and bio-fuels in general. The company logotype is more or less unrecognized by non-users; therefore both the company profile and the logotype could be used more intentionally. In order to close the gap between profile and perception, biogas producers ought to uphold their profile and continue to communicate, at the same time, uncommitted users ought to make an active choice of fuel and stop blaming media content and high prices.
8.2 Further research

This research has given Svensk Biogas an idea of the qualitative values of the company and their company profile. The thesis has manifested important conclusions of how users and prospective users of biogas perceive a biogas producing company and their product. My advice to Svensk Biogas is to use the thesis as a starting point in the continuing process with their company profile and its communication.

Throughout the composition of the thesis further research ideas have arisen. In the establishing phase when performing the literature review it came to my attention that there was a lack of scientific work regarding profile and perception of biogas and renewable fuels. The suggestion is to continue to explore this scientific area by focusing on additional stakeholders of biogas, for example politicians and automobile manufacturers. An additional suggestion is to perform similar research focusing on ethanol- and electric cars and place the obtained conclusions in relation to the thesis. This action would make it possible to distinguish similarities and differences between competitive renewable automobile fuels. The gained knowledge could be of importance when communicating and profiling renewable automobile fuels and have them penetrating the conventional fuel market.

One observation during the interviews with motorists was that men were overrepresented at the filling stations, in particular at gasoline filling stations. This observation could be something to further investigate. Coddington (1993) concludes that women tend to be greener then men and questions such as: should men or women be the target of information when profiling biogas, could be of interest. Furthermore, does gender have any importance in the context of changing the behavior of motorist and have them shift from finite to renewable automobile fuels?
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Appendix - Interview guides

Interview guide 1: Svensk Biogas focus group

Biogas

1) Why should motorists commit to biogas?
   *Varför ska bilister välja att tanka biogas?*

2) Are there any arguments contradicting biogas?
   Which are the most common arguments?
   How do you refute these arguments?
   *Finns det några motargument mot biogas? Vilka är de vanligaste? Hur bemöter Ni dessa motargument?*

3) Do you consider biogas as the solution to the vehicle-industry’s oil dependence?
   *Är biogas lösningen på fordonsindustrins oljeberoende?*

4) Who do you consider responsible to reduce the motorists contributions to global warming?
   *Vem bär ansvaret att minska bilismens bidrag till den globala uppvärmningen? (politiker, bilister, etcetera.)*

5) If we are to increase the use of biogas as automobile fuel, how do we create the prerequisites of this action?
   Who ought to facilitate the prerequisites of biogas?
   How can this be done?
   *Hur kan man skapa förutsättningar för att öka användandet av biogas? Vem/vad ska skapa dessa förutsättningar? (styrmedel, skatter, branschen etc.) På vilket sätt ska man gå tillväga? (kommunikation, media etc.)*

6) What strategy does Svensk Biogas use to gain new customers?
   *Vad har Svensk Biogas för strategi för att vinna nya bilkunder?*

Svensk Biogas

7) How do you communicate with your customers?
   What has been successful and what has not?
   *På vilket sätt kommunicerar Ni mer era bilkunder (kundkontakt)? Vad har fungerat bra/mindre bra?*
8) What are the values of Svensk Biogas?  
How do you communicate these values?

Vilka värden står företaget Svensk Biogas för?  
Hur kommunicerar ni dessa värden?

9) Why should motorists commit to Svensk Biogas?

Varför ska bilister/kunder välja Svensk Biogas?

10) How would you like to be perceived by customers and prospective customers?

Hur vill Ni att kunder och framtida kunder ska uppfatta Svensk Biogas?

11) What does the logotype of Svensk Biogas symbolize?  
(Presenting the logotype on a A4 paper)
How do you use the logotype?  
What are the thoughts and opinions about the logotype?

(Bild av logotypen) Vad symboliserar Svensk Biogas logotyp?  
Hur använder ni logotypen?  
Tankar/idéer om logotypen?)
Interview guide 2: Biogas users

1) Male/female?
   How old are you?
   Do you live in the city or the countryside?
   For how long have you fueled biogas?

Kön?
Hur gammal är du?
Bor du i stan eller på landet?
Hur länge har du tankat biogas?

Biogas

2) Why did you decide upon committing to biogas?
   Who/what influenced you?

Hur kom det sig att Du började tanka biogas?
Vem/vad påverkade dig?

3) What are the main arguments of biogas?

Vilka är de främsta argumenten för biogas?

4) Do you experience anything negative with biogas?

Upplever du någonting negativt med biogasen?

5) Why do you think the majority of motorists’ fuel gasoline?

Varför tror Du att majoriteten människor väljer att tanka vanlig bensin?

6) How do you think we can get additional motorists to commit to biogas?

Hur tror du att man kan få fler bilister att välja biogas?

7) Who do you consider responsible to reduce the motorists contributions to global warming?

Vem, tycker Du, bär ansvaret att minska bilismens bidrag till den globala uppvärmningen (politiker, bilister, media etc.)?

8) Do you believe you will purchase a biogas car the next time you change car?

Kommer Du nästa gång du köper bil att välja en biogasbil?
9) How did you first come in contact with Svensk Biogas? Did you contact them, or vice versa?

Hur kom första gången i kontakt med Svensk Biogas? Tog du eller dom kontakt?

10) What are your thoughts and opinions (perception) of Svensk Biogas? What kind of information have you received?

Vad har du för tankar och åsikter om Svensk Biogas? Vilken typ av information har du fått?

11) Is there any additional information you wish you would have received?

Är det någon typ av information du upplever att du saknat?

12) Is there anything that you are unsatisfied with when it comes to Svensk Biogas?

Finns det något Du är mindre nöjd med hos Svensk Biogas?

13) Is there anything you would like to add regarding your perception of biogas and Svensk Biogas?

Finns det något övrigt Du vill tillägga om din uppfattning av biogas och Svensk Biogas?
Interview guide 3: Non-users

1) Male/female?
   How old are you?
   Do you live in the city or the countryside?
   What type of fuel do you use?

   Kön?
   Hur gammal är du?
   Bor du i stan eller på landet?
   Vad tankar du för drivmedel?

Biogas

1) What are your thoughts and opinions about biogas?

   Vad har Du för tankar och åsikter om biogas?

2) Why do you think the majority of motorists’ fuel gasoline?

   Varför tror Du att majoriteten människor väljer att tanka vanlig bensin?

3) Who do you consider responsible to reduce the motorists contributions to global warming?

   Vem, tycker Du, bär ansvaret att minska bilismens bidrag till den globala uppvärmningen? (politiker, bilister, media etc.)

4) Could you consider buying a biogas car the next time you purchase a car?
   Why/why not?

   Skulle Du kunna tänka dig att köpa en biogasbil/tanka med biogas?
   Varför/varför inte?

Svensk Biogas

5) Do you recognize this logotype? (Presenting the logotype on a A4 paper)

   Känner du till denna logotyp? (bild av företagslogotypen)

6) Are you familiar with the company Svensk Biogas?
   What kind of information have you obtained?
   (How did you perceive the information?)

   Känner Du till företaget Svensk Biogas?
   Vilken typ av information har Du tagit del av?
   (Hur uppfattade Du informationen?)
7 What are your thoughts and opinions (perception) of Svensk Biogas?

Vad har Du för uppfattning om Svensk Biogas?

8) Is there anything you would like to add regarding your perception of biogas and Svensk Biogas?

Finns det något övrigt Du vill tillägga om din uppfattning av biogas och Svensk Biogas?