BEST
BioEthanol for Sustainable Transport

A comparative report about consumers' attitudes, worldviews and purchase intentions for clean vehicles

Comparing site data from 2006 and 2008

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BEST deals with the introduction and market penetration of bioethanol as a vehicle fuel, and the introduction and wider use of flexible fuel vehicles and ethanol cars on the market.

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Summary

This report presents data from two consumer surveys carried out in Sweden during 2006 and 2008. Two sites in the BEST-project were surveyed (BioFuel Region and Stockholm) together with owners of clean cars. The main purpose of this report is to give a descriptive account of the findings and to analyse the differences between the clean car owning groups in relation to two best sites. By carrying out this analysis, it is possible to find differences that have a potential to influence purchase decisions among different consumer segments. Since Sweden has the highest penetration rate in the EU of clean cars (mainly flexible fuel vehicles, FFVs that run on ethanol/E85), knowledge of consumers in this market is valuable for other sites and countries that are further from a market breakthrough for these types of vehicles.

The questionnaire instruments treated car owners' attitudes to cars and the environment, awareness, knowledge and replacement intentions for cars and fuels, willingness to take pro-environmental action as well as other related issues.

The results indicate that environmentally related attitudes and the endorsement of ecological beliefs have fallen somewhat across the researched sites from 2006 to 2008. This fall also seems to have spilled over on attitudes related to fossil and alternative fuels, indicating that respondents are less negative toward fossil fuel and less positive to alternative fuels in 2008 than in 2006. This pattern is not unique for this study, and can likely be attributed to the general debate on alternative fuels during 2007 and 2008. However, in contrast to this, respondents have become more knowledgeable (self-reported) about alternative fuels.

Comparing the groups, the CC group had the highest endorsement of the ecological beliefs in 2006, but in 2008 there are no statistically significant differences between the three groups on these types of beliefs. The results indicate that the self perceived knowledge of bioethanol increased significantly over the two years and that the amount of ethanol cars increased significantly among owners of clean cars. Overall replacement intentions for new cars (within six and twelve months) fell significantly, while demand for fossil-fuelled vehicles fell the most. Across the years, the clean car owners have the highest replacement intentions for vehicles fuelled by alternative fuels. Based on the results the conclusion that future demand for clean, fuel efficient and small cars will increase can be drawn. It was also found that attributes such as low fuel consumption, environmentally friendliness and the possibility of the car to run partly on ethanol were are highly ranked. Knowledge of alternative fuels increased significantly in Stockholm and in BFR. Environmental attitudes and the willingness to take pro-environmental action dropped somewhat between the two years. However, the self-reported frequency of using ethanol in flexible fuel vehicles increased.

To conclude the clean car (CC) owning group were found to be more positive to all types of alternative fuels such as natural gas and bioethanol compared to the two BEST-sites. However, it is also notable that the CC group is significantly more negative towards fossil fuel based cars, irrespective whether they are classified as clean or not. Owners of clean cars were also found to have adopted significantly more pro-environmental innovations in 2008 than the other two groups.

1. Background

Technological development and innovation is important for the transition from vehicles using fossil oil to vehicles operating on alternative fuels, such as bioethanol. However, in order for this transition to occur consumers must adopt these new vehicles and fuels. Without consumers, involvement through buying clean cars and filling them with alternative fuels no changes in emissions of greenhouse gases can be achieved. Knowledge about consumers' values, attitudes, car replacement intentions and willingness to take pro-environmental action for transportation, is crucial in order to achieve market breakthrough.

Although the amount of clean cars is increasing, only about three percent of the Swedish car fleet is defined as environmentally friendly or clean today (Sika, 2008). Although these numbers seem small, in an international perspective they are among the highest. Sweden can therefore be defined as a lead market for clean cars and alternative fuels. In this sense, the Swedish market can be used as an example of a market on its way to achieving breakthrough for clean cars and fuels. Since the numbers are continuously increasing there is a unique opportunity to study how clean cars and attitudes associated with them spread among consumers, and more importantly, how consumers view, and adopt these cars, during the time of increased adoption. Do attitudes change over time or are they stable? Do attitudes change differently in different regions (sites) and for different consumer groups, for example among the consumers that have already adopted a clean car?

During the winter of 2006 the first consumer survey was conducted on the Swedish BEST-sites (Bio-fuel Region and Stockholm) and on clean car owners. The results have been reported in D9.4 (BEST, 2007). During the fall/winter of 2008 the next survey was carried out focusing on the same sites, but using new respondents. The focus of this report is on comparing changes in consumer data between the 2006 survey and the 2008 survey.

1.1 Purpose and structure

The main purpose of this report is to give a descriptive account of the findings of the consumer surveys carried out in 2006 and 2008 in the Bio-fuel Region (BFR), in Stockholm (Sthlm) and among owners of clean cars (CC group). By describing the data gathered and sharing this with other sites in the BEST-project, other regions will have a better view of the situation in a lead market and of the situation at different stages in the market breakthrough process. Comparisons across countries and potential for benchmarking can be thus be achieved. Another purpose of this report is to analyse the differences between the clean car owning groups in relation to two best sites. By carrying out this analysis it is possible to find differences that have a potential to influence purchase decisions among different consumer segments. This knowledge will then be used to draw conclusions on the continuing market breakthrough for clean cars in Sweden.

After defining some of the key terms, the participating sites are presented together with the data collection method. In the next chapter, the results of the surveys are discussed and then the conclusions are presented.

1.2 Definitions

Below some of the most frequently used and important concepts are defined and clarified.

Concept	Definition/explanation
Alternative fuel	Fuels that are alternatives to fossil based diesel and petrol. The most common alternative fuels included in this definition are ethanol, methanol, biological gas, electricity and biodiesel.
Bifuel vehicle	A vehicle that can be propelled by both petrol and natural/biological gas from different fuel tanks.
BFR	Bio-fuel Region. An arena for regional cooperation between municipalities, universities and industry focusing on biofuel from cellulose (wood). The region is located in the northern part of Sweden consisting mainly of Västernorrland and Västerbotten counties. BFR is also a site in the BEST-project.
Car owner	An individual owning a car. In this report organizations and companies owning cars are excluded, since the general consumer is more interesting from a market breakthrough perspective. In this report the term car owner is used synonymously with consumer.
Clean car	In this report a clean car is a car that is fully or partially propelled by alternative fuel/s.
Conventional car	A car that is propelled only by fossil based diesel or petrol.
Ethanol/E85	Ethanol is C_2H_5OH. In this report ethanol for propulsion of vehicles only is in focus. This ethanol is often also referred to as E85, which is the main ethanol fuel sold in Sweden. It consists of 85 percent ethanol and 15 percent petrol.
Flexible fuel vehicle (FFV)	A vehicle that can be propelled by both petrol and ethanol (E85) in different mixtures using the same fuel tank in the vehicle. Also see passenger car.
Fossil fuels	Fuels that are produced from fossil materials such as oil and natural gas.
Passenger car	A motor vehicle that has been primarily equipped for transporting people (other than a motor cycle), however not more than driver and eight passengers (Eurostat, 2003; Sika, 2006). In this report this definition is true for the term car as well.
Pro-environmental behaviour	Significant environmental behaviour that is considerate of the environment. The opposite to anti-environmental behaviour.
Site	By site, in this report, is meant a region/city participating in the BEST-project.
Sthlm	Short for the site Stockholm.

2. The Swedish car market and data collection

The focus of this report is on private consumers' pro-environmental attitudes and purchase intentions of clean cars. In order to research attitudes and behaviour a framework for understanding pro-environmental behaviour is necessary. One of the most comprehensive and recent frameworks was developed by Stern and colleagues (Dietz et al., 1998; Stern, 2000). This research team has classified the factors influencing pro-environmental behaviour as attitudinal factors, contextual factors, personal capabilities, and habits or routines. Each of these categories has been described in a previous report (D9.4) concerning the survey carried out in 2006 (BEST, 2007). The focus in this current report is on consumer attitudinal factors and purchase intentions in Sweden and how they have changed in the two years since the initial measurement was conducted in 2006 (at the launch of the BEST project).

2.1 The Swedish car market

According to a recent Eurobarometer report Swedes are among the most aware of climate change in the European Union, perceive they are best informed about climate change, and have the strongest belief in alternative fuels as a way to reduce greenhouse gases (Eurobarometer, 2008). In a European perspective the Swedish clean car fleet and sales of alternative fuels in the form of bioethanol and biogas is the highest (European Commission, 2007). In Sweden, clean cars have been available for the wide private consumers since 2001 but the substantial take-off in sales began in 2006.

Sweden is a sparsely populated country with considerable regional differences in population density. Different regions have different local policies for traffic management and related environmental issues. Depending on perceived problems in each region, different measures are taken by local politicians. Therefore the debate, and thus car owners' attitudes, knowledge and behaviour, can be hypothesized to be different in different regions. Due to these differences, it was termed important to gather data from several different regions and thus types of car owners.

Among the first regions to introduce flexible fuel vehicles (FFVs) was the Bio-fuel region in the northern part of Sweden (Bio-fuel region, 2006). Another region of interest differing significantly from the sparsely populated north is Stockholm, the capital of Sweden. This region has the highest penetration of clean cars in Sweden. Apart from focusing on these two different regions it was also considered important to compare them to car owners that currently own a clean car. Since the penetration of clean cars in Sweden is only about three percent, a random sample would produce very few car owners from that group. Instead, it was decided to construct a group of car owners with clean cars to compare to the two regions.

In Sweden, there were nine million inhabitants and four million passenger cars in traffic at the end of 2007. Of these cars approximately 100,000 were clean cars. At the same time, there were about three million private passenger car owners in Sweden. At the time of the survey, about 20 percent of cars sold were clean cars. In Sweden, there were 464 cars per 1,000 inhabitants by the end of 2007 (Western European average 508). At the same time there were approximately 1,300 filling stations for E85 and 90 filling stations for natural/biogas across the country (SPI, 2009).

2.2 BEST site: Stockholm (Sthlm)

Stockholm county and the city of Stockholm is the most densely populated region in Sweden and hold the largest city. At the end of 2007 there were circa 800,000 cars in Stockholm and the highest penetration of clean cars in Sweden; approximately four percent or 40,000 (Sika, 2008). One of the reasons behind this leadership position is the congestion tax that was implemented and tried out during the first half of 2006 and permanently implemented August 1, 2007. Clean cars were exempted from the tax, which meant an increase in sales. Together with the implementation of the tax, wide debates and several information campaigns were carried out in relation to the referendum for transformation of the trials to a permanent system for Stockholm (Stockholmsförsöket, 2006). An acknowledgment of

this type environmental work in Stockholm came in 2009 when the city was named the first European Green Capital by the European Commission (European Commission, 2009).

2.3 BEST site: Bio-fuel region (BFR)

The Bio-fuel region consists of the two counties Västerbotten and Västernorrland and there were approximately 245,000 cars at the end of 2007. In this northern part of Sweden, where there is a heavy industrial focus on forestry, there has been an ongoing debate on current and future investments in producing bioethanol from forest products. Due to local initiatives, this region was among the first to introduce cars for bioethanol use and at the end of 2007 there were approximately 3,500 clean cars on the roads. This has also meant that the penetration of filling stations offering ethanol has been higher in percent in this part of Sweden up until recently. (Bio-fuel region, 2006; Christensen, 2005)

2.4 Sample and response rates

The two surveys (2006 and 2008) were conducted through self-completion mail-in questionnaires. For the two BEST-sites Stockholm and BFR a sample of approximately 1,000 car-owners received a questionnaire in 2006 and a different set of respondents of approximately the same number were surveyed in 2008. The random selection of respondents was carried out by the Swedish Road Administration from their database of all private passenger car owners in Sweden. In addition to the two sites, a random sample of approximately 1,000 car-owners of clean cars in Sweden was also made in 2006 and again in 2008. This selection was made in order to have a group of clean car owners to compare to in relation to the other sample.

In Table 1 the sample sizes and response rate for each group in 2006 and 2008 are presented. The response rates are calculated on the number of returned questionnaires. Before analyzing data, questionnaires with more than 50 percent missing data was deleted, as recommended by Hair et al. (Hair et al., 2006). The non-response rate is satisfactory in relation to the amount of questions in the surveys. Dial-up reminders to all respondents who had not returned the survey within one week achieved the relatively high response rate. During these evening dial-ups, an unstructured non-response bias analysis was conducted showing that the most common reasons for not participating in the study was lack of time and language problems. Otherwise, there were no detectable differences between respondents and non-respondents.

As can be seen in the Table 1 the response rate in 2006 was highest in the Bio-fuel region (BFR), followed by the clean car (CC) owners and then by the site of Stockholm (Sthlm). For 2008, the response rates were highest among CC owners and then at BFR. The responses per gender closely match the data for ownership of cars in general in Sweden, where two thirds of the cars are registered to males. In 2006, 32 percent of respondents were female and for 2008 this percentage was 33. Although there are slight differences in response rates the overall conclusion is that the two surveys are meaningful to compare without weighing data statistically.

Table 1: Sample and response rate per site

Site and country	Sample	Responses*	Response rate	Female*	Male*
Stockholm, 2006	1,010	395	39 %	141	243
Bio-fuel region, 2006	1,010	522	52 %	165	346
Clean car owners, 2006	993	512	52 %	150	358
Total 2006	**3,013**	**1,429**	**47 %**	456	947
Stockholm, 2008	1,016	345	34 %	129	200
BioFuel Region, 2008	1,019	441	43 %	149	288
Clean car owners, 2008	1,009	534	53 %	159	373
Total 2008	**3,044**	**1,320**	**43 %**	437	861
* The Female/Male response item was a self-report item. Adding up Female/Male responses does therefore not result in the same number as in the Response column.					

2.5 Questionnaires for 2006 and 2008

The questionnaires used for data collection on consumers were developed on a framework for understanding pro-environmental consumer behaviour and purchase intentions based partly on previous research (e.g. Marell et al., 1995; Nordlund, 2002; Stern, 2000). The questionnaires consisted of several sections that were the same in 2006 and 2008, but some items were dropped, and some were added for the 2008 survey. The full items used in this report are included as Appendix 1.

The **background section** of the questionnaires consisted of questions regarding standard background factors and demographics, such as gender, age, education level, employment status, and income.

In the next section, **background factors concerning currently owned car and fuel type** were examined. In this section, some questions about the respondent's awareness, knowledge and experience of different types of fuels was included in addition to specific behavioural issues (for example partaking in a course on eco-driving, etc).

A section on **car usage** was also included measuring what the currently owned cars is used for. The scales in this part was constructed based on previous research such as Nordlund and Garvill (2003).

The next section covered **car replacement intentions**. Car owners' plans to replace the current car was researched, such as how probable they perceived it to be that they would replace the existing car within twelve months; replace it with a brand new car or a used car; replace it for a car defined as a clean car; and what type of fuel they would chose. Questions are partly based on previous research such as Garvill et al. (2004)

In the 2008 survey a section on **important attributes** when replacing the current car was included. The attribute list was partly developed based on previous research (Potoglou and Kanaroglou, 2007) and media searches.

The subsequent section related to **cars and environmental effects**. Questions were asked how the car use was perceived to affect the environment, health and personal economy. This section was only used in the 2008 survey.

The next section covered **knowledge of ethanol as a fuel.** The questions were developed from newspaper articles and web sites concerned with ethanol as an alternative fuel and clean vehicles (e.g. Bio-fuel region, 2006; Gröna bilister, 2006; Miljöfordon, 2006).

After that a section on **attitudes and the environment** was included. Apart from attitudes, the new ecological paradigm (NEP, Dunlap et al., 2000) was assessed, which measures endorsement of the new ecological paradigm in relation to the dominant social paradigm (Kilbourne et al., 2002; Shafer, 2006). A higher endorsement of the NEP generally means a more pro-environmental worldview. In 2008 this section was expanded to also include aspects of technology optimism (Scheier et al., 1994) in relation to the environment.

What the respondents were willing to do themselves, in order to improve the environment, was assessed in the next section on **willingness for pro-environmental action**. Statements on willingness to reduce car use, reduce speed when driving, to choose a more environmentally friendly car the next time a car is to be purchased, to use public transportation instead of using the car, were included.

Further on, a section of questions covered **other types of pro-environmental behaviours**, such as recycling waste, saving water and energy, purchasing energy efficient products, etc. This section was included in order to pursue the relationships between these behaviours and the adoption of clean vehicles.

Lastly two sections covering the **adoption of other pro-environmental innovations** and the attitudes toward these innovations were included. Innovations such as water saving shower and tap heads, energy saving lamps, solar panels and three plate glass windows were included.

3. Results

In this chapter, the results from the surveys are presented and discussed. The data below is displayed in the form of means or percentage frequencies for each site. The coding for each item can be found in Appendix 1. In general, a lower number/mean corresponds to a low likelihood/knowledge/intention etc. The main purpose of this report is to give a descriptive account of the findings of the consumer surveys carried out in 2006 and 2008 in the Bio-fuel Region (BFR), in Stockholm (Sthlm) and among owners of clean cars (CC group).

When statistically significant differences were found, they are reported below. A significance level of 95 percent was chosen (p < .05), meaning that the difference found is to 95 percent certain and not a random occurrence. In case of interval scales two-tailed t-test were used to analyze differences, and in cases of categorical variables, Chi-square test were used with the same significance level. Significance tests were carried out for all background, attitudinal, intentional and behavioural measurements and are reported as differences between the samples of 2006 and 2008.

3.1 Background factors

Table 2: Background factors

Variables	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
Age of owner, mean	50.7	52.3	51.5	54.4*	54.6	53.3
Schooling, mean	2.26	2.16	2.47**	2.39	2.21	2.45**
Less than 9 years, %	20	26	12	14	23	16
Between 9 and 12 yrs, %	37	32	29	34	34	25
More than 12 years, %	43	42	59	52	44	59
Univ. graduation., %	31	23	41**	30	24	39**
Children, %	43	33	35	33*	35	36
Single person household, %	23	27	14**	22	27	13**
Employment						
Full time, %	54	51	59	49	51	58
Part time, %	7	8	7	6	8	9
Self-employed, %	13	5	11	10	6	6
Studying, %	3	2	1	1	1	0
Household work, %	1	1	0	1	0	1
Unemployed, %	2	3	0	0	2	1
Retired, %	19	28	21	31	31	25
Sick-listed, %	3	2	1	2	1	1
Income in thousands, mean	3.05	2.69	3.30**	3.60*	2.91	3.58**
< 100 SEK, %	6	8	4	5	6	3
100 – 200 SEK, %	28	38	23	17	31	18
200 – 300 SEK, %	38	35	35	30	40	31
300 – 400 SEK, %	16	15	23	23	17	27
400 - 500 SEK, %	8	3	7	12	6	10
>500 000 SEK, %	5	2	8	12	2	11

Sthlm = BEST Site Stockholm, BFR = Bio-fuel Region, CC = Clean car owning group
Non-responses and rounding mean that all variables do not always add up evenly
* Statistically significant difference between the 2006 and 2008 groups the p < .05
** Statistically significant difference between the CC group and at least one other group at p < .05

The background factors focus primarily on socio-demographic data. As can be seen in Table 2 there are small differences in age between the sites and between the data for 2006 and 2008. The only significant difference is between the two Stockholm groups were the 2008 group is significantly older than the 2006 group. Concerning number of years spent in school the significant differences occur

between the clean car owning groups (CC) of both years in relation to the other sites. However, there are no significant differences from the first measurement year to the second. The case is similar for number of university degrees where in 2006 and 2008 the owners of clean cars (CC) are the ones with the highest number of university degrees, but over time, there is no significant change. In the Stockholm sample of 2006, 43 percent of the respondents had children in the household, which is the highest number overall. For the 2008 sample, this number is significantly lower. It is also notable that the CC groups in both years have the lowest amount of single person households and that the change from 2006 to 2008 is non-significant for all groups. Concerning employment there are no significant differences except for the Stockholm sample where 30 percent of the sample in 2008 were retired, compared to the 2006 where this number was 19 percent. In 2006, the CC owners had significantly higher incomes compared to the other groups. In 2008, this difference has become significantly smaller and the Stockholm sample is the one with the highest income in this measurement. The BFR sample has the lowest average income in both 2006 and 2008 among the three groups, and although the number increased in 2008, the difference in not statistically significant.

Taken together, the background factors show that the groups are relatively similar between the two years and that the CC group sticks out in terms of education, income, and amount of single person households. In conclusion, the analysis of the background factors show that is meaningful from both a statistical perspective and from an empirical one to compare the different consumer groups over time.

3.2 Car and fuel related background factors

Together with socio-demographic background factors, car and fuel related factors were also surveyed. As can bee seen in Table 3, there are no significant differences between awareness of petrol and diesel across the three groups and over the two measurement years. However, the Stockholm group has become significantly more aware of all alternative fuel between 2006 and 2008. The case is similar for the Bio-fuel region group were awareness has increased significantly for all alternative fuels except for electricity/hybrid and ethanol/E85. The awareness in the CC group is stable across the years and this group has the highest overall awareness of all alternative fuels in both years. Thus concerning knowledge of ethanol/E85, it has increased significantly in the Stockholm and in the BFR group, but not in the CC group, where awareness was close to 100 percent already in 2006. In this sense, the awareness of the two BEST-sites is nearing the awareness levels of the CC group.

The number of cars in the households of the groups is stable across the two years and the BFR sample has the highest numbers of cars in both years. Size classifications of cars are also stable across time, with only minor, non-significant differences between groups. In addition, annual driving distances are stable across the two years in all three groups with owners of clean cars driving significantly longer distances for both measurement years.

In 2008, significantly more respondents judge their cars to be environmentally friendly in the Stockholm and BFR groups. This can to some extent be explained by the higher penetration rate of clean cars in 2008 and the higher rates of small cars (that are classified as environmentally friendly in Sweden if they emit less than 120 grams of carbon dioxide per kilometre). Close to all respondents in the CC group, classify their cars as environmentally friendly in both years.

The fuels for the cars in the different groups are largely similar across the two years. However, the amount of diesel cars has increased significantly at the BFR site and the amount of natural/biogas cars have decreased at the same site.

To complete the car and fuel related background factors a number of yes and no questions were asked on some key behaviours among the respondents during the last year. As illustrated in Table 3 car owners in Stockholm and BFR who had travelled in a clean car increased significantly over the two years. The same is the case for having driven an ethanol/E85 car which increased from 12 percent at the Stockholm site to 18 percent in 2008.

Table 3: Car and fuel related background factors

Variables	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
Awareness of fuels (multiple alternatives)						
Petrol, %	98	99	98	100	99	98
Diesel, %	90	95	97	98	98	95
Bio-diesel, %	32	36	52**	47*	48*	58**
Electric power/hybrid, %	67	68	80**	81*	71	80**
Natural gas, %	38	31	61**	49*	38*	57**
Bio-gas, %	63	47	82**	71*	60*	78**
Ethanol/E85, %	80	89	98**	93*	93	99**
Number of cars, mean	1.49	1.57	1.50	1.49	1.55	1.49
1, %	59	54	61	58	54	62
2, %	34	38	32	36	37	31
3, %	6	5	5	4	6	6
> 3, %	1	3	3	2	2	2
Classify car as, mean	2.06	2.02	2.08	2.00	2.09	2.08
Small, %	21	24	8	25	23	9
Mid sized, %	55	54	76	55	51	77
Large, %	21	20	15	18	21	15
SUV/Mini bus, %	3	3	1	3	5	0
Classify car as						
Standard, %	87	88	2**	83	79*	3**
Env. friendly, %	8	7	96**	14*	14*	95**
Driving dist., mean	1.63	1.65	2.07**	1.64	1.63	1.97**
< 10,000km, %	49	47	23	50	50	24
10,000 – 20,000 km, %	42	43	54	40	42	59
20,000 – 30,000 km, %	5	7	17	9	7	14
> 30,000 km, %	3	3	7	2	2	3
Fuel for vehicle						
Petrol, %	93	90	7**	91	87	3**
Diesel, %	4	9	1**	5	11	0
Flexi-Fuel/E85, %	2	1	74**	3	2	83**
Hybrid/Electric power, %	0	0	6**	1	0	6
Bi-fuel (Natl./Biogas), %	1	0	11**	1	0	5**
Ethanol hybrid, %	0	0	2**	0	0	2
During the last year, I have…(multiple alternatives)						
Travelled with alt. fuel., %	24	23	97**	37*	33*	98**
Driven ethanol, %	12	17	82**	18*	24*	89**
Inconvenient truth film, %	2	1	4	15*	13*	24**
Workshop, %	4	7	6	5	3	4
Course Eco drive, %	3	6	5	6	7	9**
Signed petition, %	21	33	17**	16	33	14**
Acquaint. owner ethanol/E85, %	29	31	75**	47*	48*	80**

Non-responses and rounding mean that all variables do not always add up to 100%
* Statistically significant difference between the 2006 and 2008 groups the $p < .05$
** Statistically significant difference between the CC group and at least one other group at $p < .05$

The film, An inconvenient truth by/with Al Gore had just premiered when the 2006 survey was carried out, so in that year the number of respondents who had watched it were low. However, in 2008, the numbers increased significantly for all groups. The actual increase was the highest in the BFR group where 13 percent had seen the film when the survey was carried out in 2008 which is a increase by thirteen times compared to the Stockholm site (seven times increase) and the CC group (six times increase.

The amount of people having attended a workshop, taking a course on fuel-efficient driving (eco driving), and signing a petition for a decrease in petrol prices, stayed similar across the years. It is notable that the BFR sample exhibits the highest amount of petition signers across the groups in both years and the CC group the lowest.

The amount of people having an acquaintance owning an ethanol car rose significantly across the two years, most notably in Stockholm with an increase of 18 percentage points (from 29 to 47). The highest amount of acquaintances owning an ethanol car was found in the CC group of both years.

According to our results, it can be concluded that the vast majority of ethanol car owners view ethanol cars as environmentally friendly. It is also evident that awareness of fossil oil alternative fuels and behaviours like trying out vehicles before purchase is growing faster than the actual sales and penetration of the vehicles. The number of ethanol cars owned by the respondents in the different groups is increasing together with diesel cars at the expense petrol cars. The main competitor in this sense for the ethanol vehicle is thus not the petrol car or the natural/biogas car, but the diesel-powered car.

3.3 Car usage

As can bee seen in Figure 1 and Table 4 the most common trip that the car is used for is the category classified as other trips (pick up/drop off children, visit friends, etc) and the CC owners use the car for these types of trips the most across the groups in both 2006 and 2008. Although the differences are small across the years, there is evidence of a trend that car use is decreasing across the groups for all trips. The increases in the BFR group in terms of trips on the job and for shopping are non-significant. However, the decrease in the Stockholm groups in terms of trips to/from work is statistically significant and correlates well with public data available on the traffic behaviour in Stockholm. It is not surprising that respondents in the BFR groups use their cars more on average since the area is larger and less densely populated than Stockholm, which as a higher penetration of public transportation systems. However, the data also show that the clean car owners use their cars significantly more for trips to/from work, in 2008 and for trips on the job in 2006. This finding can probably be related to the fact that clean car owners on average have newer cars, and these tend to be used more, irrespective of car type. However, on average (grand mean of all four types of car usage behaviours) there are no significant differences between the three groups or across the two years.
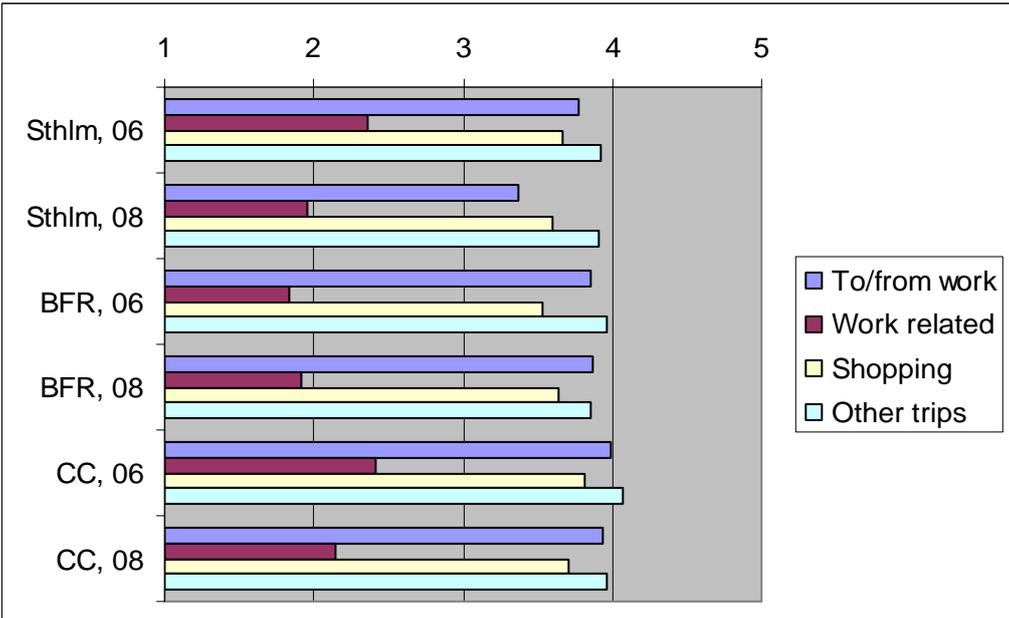
Figure 1: Car usage

Table 4: Car usage

Car use for, means[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
To/from work	3.78	3.85	3.99	3.37*	3.88	3.94**
On job	2.36	1.82	2.41**	1.96*	1.91	2.14
Shopping	3.67	3.53	3.81**	3.60	3.64	3.71
Other trips	3.92	3.96	4.07	3.91	3.86	3.96
Grand mean	**3.40**	**3.26**	**3.55**	**3.20**	**3.29**	**3.39**

[1] Scale from 1=Never, to, 6=More than 5 times a week
* Statistically significant difference between the 2006 and 2008 groups the $p < .05$
** Statistically significant difference between the CC group and at least one other group at $p < .05$

3.4 Car replacement intentions

Although intentions for an actual behaviour are influenced by many factors that make the intentions less reliable, intentions are still a good indicator of a current stated target behaviour (Alwitt and Pitts, 1996; Jansson et al., 2007; Marell et al., 2004). In the two surveys, several types of car related replacement intentions were measured and the results are presented in Table 5.

Overall, the replacement intentions (within six and twelve months) have fallen significantly across all groups. The CC groups in both years show significantly lower overall replacement intention, likely due to that they also have the newest cars of the three groups.

Table 5: Replacement intentions

How likely to replace, means[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
6 months	1.64	1.56	1.41	1.47	1.40	1.26**
12 months	2.12	1.94	1.76**	1.91	1.71	1.46**
Larger	1.98	1.86	1.89	1.59	1.47*	1.43**
Smaller	2.32	2.24	1.93**	2.26	2.34	2.07**
More horse power	2.32	2.40	2.43	1.85*	1.82*	1.69**
Less horse power	2.23	2.14	1.96	2.26	2.20	2.02
Mainly petrol	3.22	3.22	1.60**	2.70*	2.77*	1.41**
Mainly diesel	2.09	2.43	1.89**	2.20	2.29	1.80**
Mainly bio-diesel	-	-	-	2.05	1.96	2.09
Partly electricity/hybrid	1.90	1.48	2.36**	1.65	1.65	1.65
Partly natural/biogas	1.86	1.48	2.26**	1.95	1.50	2.28**
Mainly ethanol	2.31	2.35	3.72**	2.35	2.22	3.63**
Environmentally friendly	2.92	2.89	4.50**	3.12	2.78	4.39**

[1] Scale from 1=Not likely, to, 5=Very likely
* Statistically significant difference between the 2006 and 2008 groups the $p < .05$
** Statistically significant difference between the CC group and at least one other group at $p < .05$

Intentions for purchasing larger cars have dropped significantly between the two years in the BFR and CC groups. In contrast, stated intentions for smaller cars have increased for the CC group. In addition, replacement intentions for cars with more horsepower have dropped significantly for all groups, with steepest drop in the CC group between the two years. There is a slight (non-significant) increase in the intentions for cars with less horsepower, completing the picture of a market demanding smaller and less powerful cars.

The replacement intentions for cars that run mainly on petrol had decreased significantly across the three groups. The lowest intentions to purchase petrol and diesel car is exhibited within the two CC groups. Purchase intentions for electricity/hybrid, natural/biogas and ethanol/E85 cars are stable across the years. However, the CC group has the highest mean replacement intentions for these types of cars overall.

Replacement intentions were also measured for cars that are classified as environmentally friendly. These intentions were found to stable across the years with the CC group exhibiting the highest intentions among the three groups in both years.

The questionnaire conducted in 2008 was expanded to also included measurements on 43 different car attributes related to replacement (presented in Appendix 1). Respondents were asked to rate each of these attributes on a scale ranging from not important at all (1) to very important (5) on a five-point scale. In Table 6 the ten top ranked attributes (by means) are presented with the CC group as the base group. As is apparent in the table, the order of rankings is relatively similar across the three groups. The highest ranked attribute for all groups was high operational reliability, i.e. that the car does not break down. Collision safety and road handling were also highly ranked attributes. However, the CC group rank low fuel consumption as the third most important attribute, where the other groups rank this as number four. Low carbon dioxide emissions of the car is also ranked higher among CC owners (place six with a mean of 4.40) which is significantly higher than for the other two groups (place 7). In addition the CC group rank the environmental aspect of the car (as environmentally friendly as possible) as number five, where the other groups rank it as nine and eight. In this sense the CC groups sticks out in relation to the two BEST-sites.

Table 6: Ten most important attributes when replacing the current car

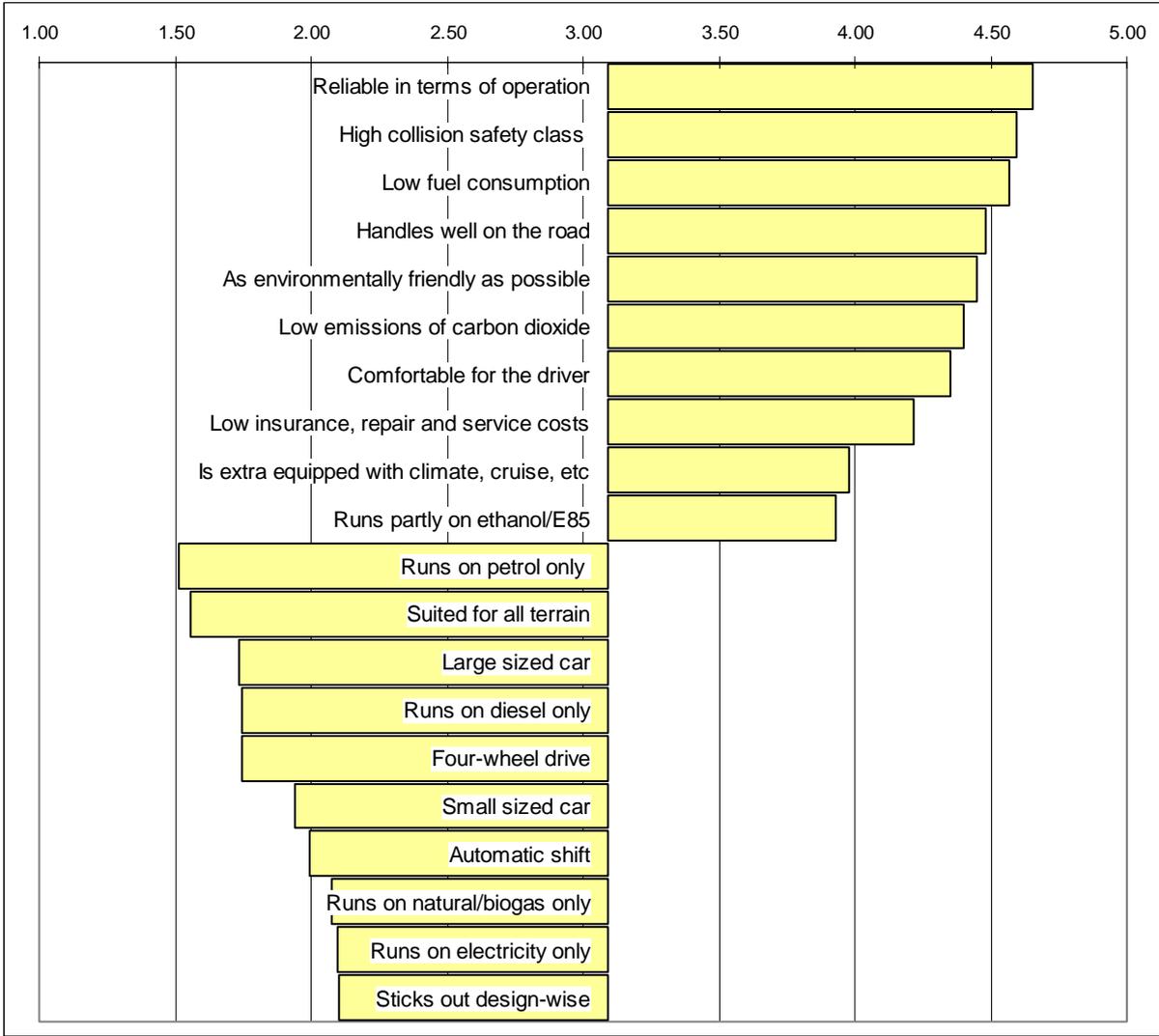| Importance mean and rank within group[1]	Sthlm, 08		BFR, 08		CC, 08	
Order within CC, 08 group	Rank	Mean	Rank	Mean	Rank	Mean
Reliable in terms of operation	1	4.54	1	4.53	1	4.66
High collision safety class	2	4.40	3	4.37	2	4.60**
Low fuel consumption	4	4.35	4	4.32	3	4.57**
Handles well on the road	3	4.35	2	4.42	4	4.48
As environmentally friendly as possible	8	3.99	9	3.88	5	4.45**
Low emissions of carbon dioxide/CO_2	7	4.07	7	4.01	6	4.40**
Comfortable for the driver	5	4.24	6	4.23	7	4.35**
Low insurance, repair and service costs	6	4.21	5	4.28	8	4.22
Is extra equipped with climate, computer, etc	14	3.58	15	3.48	9	3.98**
Runs partly on ethanol/E85	21	2.61	21	2.70	10	3.93**
[1] Scale from 1=Not important at all, to, 5=Very important						
A total of 43 attributes were included, see Appendix 1						
** Statistically significant difference between the CC group and at least one other group at p < .05						

It is notable that out of the ten highest ranked attributes, seven are statistically significantly different between the CC group and the two BEST sites. Of these seven attributes, four are related to the environment and environmental effects of car use. The differences between the Stockholm and Bio-fuel region groups are not statistically significant for any of the top ten attributes.

When an analysis is conducted on the ten lowest ranked attributes, the results show a similar pattern as for the top ten attributes in that the differences between the CC groups and the other two groups are statistically significant, but not the differences between the two BEST-sites.

In Figure 2 the top ten attributes are contrasted with the bottom ten attributes within the CC group. The grand mean for all attributes (3.09) is used as the centre of the horizontal axis in the figure.

The feature that the car runs only on petrol is the lowest ranked attribute of all 43 (men = 1.51). Thereafter follows attributes such as all terrain properties, that the car is large, that it runs on diesel only and that the car is equipped with four-wheel drive. It is also interesting to note that this group does not prefer either small (mean = 1.94) or large cars (mean = 1.73). However, they rank mid sized cars as much more preferable (mean = 3.53). That the car has an automatic gearbox, runs on natural/biogas, electricity, and sticks out design wise are also lowly ranked attributes.

Figure 2: Ten most and ten least important attributes for car replacement (CC group, 2008)

Attribute	Value
Reliable in terms of operation	~4.65
High collision safety class	~4.58
Low fuel consumption	~4.55
Handles well on the road	~4.45
As environmentally friendly as possible	~4.43
Low emissions of carbon dioxide	~4.38
Comfortable for the driver	~4.33
Low insurance, repair and service costs	~4.18
Is extra equipped with climate, cruise, etc	~3.95
Runs partly on ethanol/E85	~3.90
Runs on petrol only	~1.55
Suited for all terrain	~1.55
Large sized car	~1.75
Runs on diesel only	~1.80
Four-wheel drive	~1.85
Small sized car	~1.95
Automatic shift	~2.05
Runs on natural/biogas only	~1.60
Runs on electricity only	~1.75
Sticks out design-wise	~1.80

Turning to the other two groups it is apparent that they also match each other closely in terms of low ranked attributes. However, where the Stockholm group ranks possibility to drive in terrain the lowest (mean = 1.69), the BFR group rank the feature of the car only running on natural/biogas as the lowest attribute (mean = 1.50). The BFR group prefers terrain abilities, ethanol fuel, four-wheel drive and diesel fuel significantly higher than the Stockholm group.

Taken as a whole the replacement intentions appear to be relatively stable over time, with a slight drop in general for 2008. From the results, the conclusion that future demand for clean cars or so called environmentally friendly cars will increase slightly on a yearly basis seems relevant. Changes over two years are however too small to measure. Nevertheless, the trend towards smaller cars with less horsepower seems currently to be more forceful than the interest in clean cars. It is also notable that the clean car owning group exhibit significantly more positive perceptions of environmentally related car attributes such as low carbon dioxide emissions and low fuel consumption. Compared to similar studies on important attributes for car owners (e.g. Hendrickx and Uiterkamp, 2006) it is somewhat of a breakthrough that low fuel consumption ranks top three together with the classic attributes of reliability, safety and comfort.

3.5 Cars and effects on the environment

During the last two to three years the debate on environmental issues in general and global warming and transportation in particular, has become more widespread. One way to measure if this debate has any effect on consumer attitudes is to follow them over time. A section on perceived environmental effects of cars was thus added in the 2008 survey. The respondents were asked to rate their agreement/ disagreement on a five point scale on seven statements. In Table 7 the mean values are presented for the three different groups. As can be seen in the table, the Stockholm sample has the highest perception of negative consequences of car driving on the environment, followed by BFR and CC groups. The Stockholm group also has significantly higher perception of the assertion that car travelling disturbs animals and humans in the form of noise. Also in terms of health aspects, the Stockholm sample is more aware of the negative consequences of driving, however this difference is non-significant. The BFR sample is, on the other hand, significantly more aware of the negative economic aspects of car driving, than the other two groups. The CC group is significantly less concerned on both economical aspects.

The overall picture is that the Stockholm group is more aware of negative environmental and health aspects, whereas the BFR group is more aware of the negative economical aspects of car use. The CC group is in between the two other groups, except for the first question concerning negative environmental aspects. The reason behind this low rating in this group might be the perception that these respondents already have taken environmental action and purchased a clean car, and thus do not perceive that they contribute negatively as much as the other two groups.

Table 7: Opinions of car use and effects on the environment, health and personal economy

Opinion, means	Sthlm, 08	BFR, 08	CC, 08
Your car use has a negative effect on the environment	3.53	3.41	3.14**
Your car use has negative effect on the landscape in that roads etc. are built	2.83	2.66	2.70
Your car use disturbs animals and humans due to noise	2.93	2.62	2.79**
Your car use has a negative effect on your own health	2.63	2.56	2.57
Your car use has a negative effect on other peoples' health	2.96	2.80	2.76
Your car use is expensive for you in the form of insurances and other fees	3.15	3.24	2.87**
Your car travelling is expensive for you in the form of expensive fuel	3.35	3.60	2.98**

[1] Scale from 1=Strongly disagree, to, 5=Strongly agree
** Statistically significant difference between the CC group and at least one other group at $p < .05$

3.6 Knowledge about ethanol

When an innovation is introduced in the market, it is not uncommon that knowledge is low and myths (often-called urban legends) about the innovation spread. One way to measure perceived knowledge is to combine the perception of truthfulness and certainty of different aspects of a product. This was done in regards to ethanol as a fuel in the surveys of 2006 and 2008. The items and corresponding means are presented in Table 8 for each group for the two years.

It is apparent that the CC group has the highest perception of certainty/truth in relation to the other groups in regards to the knowledge items for both years. The changes over time are relatively similar across the groups and there is support for the conclusion that knowledge of ethanol as a fuel has increased significantly during the two years. Notable is that the CC group perceives that cars fuelled by ethanol are easier to start in 2008 than in 2006. This change could reflect that cars have become better tweaked for the cold climate and/or that the ethanol blend in Sweden during the winter months is E75 (75 percent ethanol and 25 percent petrol) since 2007. Thus the cars should, everything else being equal, be easier to start.

Another interesting finding is that is was perceived as more expensive to drive on ethanol in 2006 across the groups compared to the 2008 situation. However, the change difference is only statistically significant for the BFR and CC group. This perception is in line with the price on petrol and ethanol at

the time of the surveys. During the fall/winter of 2006, the prices of petrol and gasoline were about equal, but in the summer/fall, 2008 the price of ethanol was about 10-20 percent cheaper compared to the petrol prices.

Overall the conclusion from these measurements is that the level of knowledge concerning ethanol fuelled cars has increased over the two years.

Table 8: Perceived knowledge about ethanol

Knowledge items, means[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
Ethanol, that can be used for cars in Sweden, consists of 85 % ethanol and 15 % petrol						
	3.52	3.82	4.55**	3.61	3.70	4.43**
A car fuelled by ethanol is harder to start at degrees below zero						
	3.10	3.38	4.11**	3.16	3.56	3.63**
In Sweden today there are about ten filling stations for ethanol/E85[2]						
	3.60	3.96	4.65**	4.35*	4.28*	4.85**
Today there is only one manufacturer of cars that run on ethanol/E85 mainly[2]						
	3.83	3.96	4.61**	4.14*	4.15	4.70**
So called flexifuel vehicles are fuelled by ethanol and have two fuel tanks[2]						
	3.01	3.52	4.67**	3.35*	3.84*	4.77**
Calculated in kronor per 10 kilometres, it is more expensive to drive on ethanol than petrol						
	3.02	3.26	3.50**	2.94	2.91*	2.49**
When leaking, ethanol is worse for the environment than ordinary petrol						
	2.31	2.10	2.00**	2.29	2.18	1.90**

[1] Scale: From 1=False for sure, 3=Unsure if true or false, to, 5=True for sure
[2] False statement; answer has been reversely coded
* Statistically significant difference between the 2006 and 2008 groups the $p < .05$
** Statistically significant difference between the CC group and at least one other group at $p < .05$

3.7 Attitudes about the environment

Attitudes concerning fossil fuels and the environment in general were measured in the two surveys. A measure on the possibility of using technology for solving environmental problems was added in the 2008 survey. In Table 9 the means for the attitudinal items relating to fossil oil use are presented. It is clear from these numbers that in general the attitudes toward fossil fuel have changed significantly.

The results indicate that respondents felt less morally responsible in relation to fossil fuels in the 2008 sample compared to the 2006 sample. The largest drops have occurred in the CC group, but also in the BFR group, the drop is considerable especially for the last two items. The grand mean has thus decreased significantly for all groups except the Stockholm one. However, the CC groups have the highest attitudinal perception in both years. Although the results are somewhat puzzling, they can perhaps be attributed to the fact that the recent debate on biofuels has made people less negative in general towards fossil oil and less positive towards alternative fuels. Although, this might be the case, the number as such are still high.

In addition to attitudes toward fossil fuel use, general ecological beliefs were also assessed. The scale used was the so called New Ecological Paradigm (NEP) scale as developed by Dunlap et al. (2000) consisting of 15 items as presented in the 9.4 BEST-report and in Appendix 1. The 15 items were summated and the means of the different groups and the different sits are presented in Table 10. From this presentation, it is apparent that endorsement of the ecological beliefs has fallen significantly between the two years, except for the Stockholm site. The CC group had the highest endorsement of the NEP in 2006, but in 2008, there are no statistically significant differences between the three groups on the NEP.

Table 9: Attitudinal items and means per category

Attitudinal item, means[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
I feel that it is important to travel by car using fossil fuels, oil/petrol/diesel, as little as possible						
	3.59	3.69	4.20**	3.65	3.57	3.78**
I feel morally responsible to conserve oil/petrol/diesel no matter what other people do						
	2.96	2.91	3.99**	2.89	2.68	3.93**
People like me should do everything they can to reduce their use of fossil fuels such as oil/petrol/diesel						
	3.65	3.61	4.19**	3.32*	3.37*	3.78**
I feel morally responsible to use electricity or alternative fuels instead of oil/petrol/diesel						
	3.62	3.60	4.08**	3.28*	3.27*	3.85**
Grand mean	**3.46**	**3.46**	**4.13****	**3.30**	**3.22***	**3.89****

[1] Scale: From 1=Strongly disagree, to, 5=Strongly agree.
* Statistically significant difference between the 2006 and 2008 groups the p < .05
** Statistically significant difference between the CC group and at least one other group at p < .05

In the 2008 survey, a measure on general technology optimism and technology optimism for environmental solutions were also included. These scale consisted of five and eight items respectively and the scales were significantly lower rated than the NEP. However, there were no statistically significant differences between the three groups on the two technology measures.

Table 10: Humans and the environment

Construct[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
New ecological paradigm[2]	3.81	3.91	4.01**	3.81	3.72*	3.80**
General tech. optimism[3]				2.84	2.88	2.89
Environmental tech. optimism[4]	-	-	-	2.50	2.50	2.54

[1] Scale: From 1=Strongly disagree, to, 5=Strongly agree
[2] 15 items in construct
[3] 5 items in construct
[4] 8 items in construct
* Statistically significant difference between the 2006 and 2008 groups the p < .05
** Statistically significant difference between the CC group and at least one other group at p < .05

Overall the conclusion from the measures of attitudinal factors shows a decline in environmental attitudes. This relative decline, from exceptionally high levels by the end of 2006 and during 2007 has also been recorded in other similar types of studies (Länsförsäkringar, 2008) focusing on general pro-environmental attitudes. However, it is important to note that the clean car-owning group in our study has the most pro-environmental attitudes for both 2006 and 2008.

3.8 Willingness to take pro-environmental action

Both surveys included measures on willingness to take pro-environmental action in relation to individual transportation. The nine first items focused on curtailment behaviours (reducing environmentally harmful behaviours) as defined by Black et al. (1985). The last two items focused on technological choices as pro-environmental behaviour. The items and means are presented in Table 11.

In general the willingness to take pro-environmental curtailment action has fallen significantly for the Stockholm group and the BFR group, and is close to the same for the CC group on most of these items. Turning to the two technology choices it is apparent the results are more stable over time, with the CC group exhibiting the highest willingness in both years compared to the other groups. Overall, these findings are in line with our other findings on attitudes and show a slight decline in willingness to take pro-environmental action. Due to this general lowering of willingness in the Stockholm and BFR groups compared to the CC group, the grand mean of all items taken together is statistically

significantly different between the CC group and the other groups in 2008, compared to 2006, where there were no statistically significant differences.

Table 11: Willingness to take pro-environmental action

Willingness, mean[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
Decrease car use on shorter trips	3.82	3.78	3.79	3.65	3.68	3.85
Decrease car use on longer trips	2.95	3.01	2.99	2.95	3.20	3.15
Car-pool more to work/school	2.95	3.27	2.92**	2.68	3.12	3.08**
Drive slower on free/highways	3.48	3.78	3.54	3.20	3.61	3.44**
Drive more fuel efficient/eco-drive	4.09	4.30	4.33	3.81*	3.97*	4.08**
Travel by public transportation more instead of car use	3.38	2.94	3.21	3.02*	2.58*	2.97**
Go by train more instead of flying when possible on longer trips	3.46	3.43	3.65	3.48	3.63	3.73**
Bicycle or walk on shorter trips in the summer	4.30	4.34	4.38	4.04*	4.12*	4.31**
Bicycle or walk on shorter trips in the winter	3.48	3.51	3.50	3.19	3.34	3.45**
Choose a more environmentally friendly car the next time you replace your car	3.88	3.82	4.28**	4.00	3.88	4.44**
Choose a more fuel efficient car the next time you replace your car	4.14	4.22	4.31	4.30	4.21	4.44**
Grand mean	**3.63**	**3.68**	**3.72**	**3.48**	**3.58**	**3.72**

[1] Scale: From 1=Strongly disagree, to, 5=Strongly agree
* Statistically significant difference between the 2006 and 2008 groups the $p < .05$
** Statistically significant difference between the CC group and at least one other group at $p < .05$

3.9 Motivation and usage of ethanol/E85

In addition to measuring the level of attitudes to cars, fuels and the environment, several different pro-environmental behaviours were also assessed. Firstly, the focus was on the usage of ethanol as a fuel among car owners of ethanol cars (for simplicity refereed to as clean car owners below). The sample in 2006 included 424 ethanol owners and in 2008, the amount of ethanol car owners was in total 451.

As presented in Table 12 the ethanol car owners have increased their self-reported use of ethanol from a mean of 4.16 in 2006 to 4.47 in 2008, which is significantly higher. The 2008 sample also perceives this behaviour to be more important and significantly less effort is required to use this alternative fuel. However, the 2008 sample perceived the environmentally positive aspects to be significantly lower, than the 2006 group. The 2008 group reports performing the behaviour more for personal financial reasons and less for health reasons, than the 2006 group. In general, the 2008 respondents perceive it to be significantly less complicated and time consuming to use ethanol as a fuel than the 2006 group. Other changes in motivations for using ethanol are not statistically significant.

Overall, the conclusion from this analysis is that consumers have become more used to the fuel ethanol as such and see the barriers against using it as significantly lower from 2006 to 2008. In addition, it is evident that using ethanol for personal financial reasons has become a stronger motivator over the course of the two years.

Table 12: Frequency and reason for using ethanol/E85

Frequency and reason	CC, 06[5]	CC, 08[5]
Frequency of ethanol/E85 use, mean[1]	4.16	4.47*
Importance, mean[2]	4.15	4.13
Amount of effort, mean[3]	2.09	1.79*
Good for the environment, mean[4]	4.83	4.66*
Good for personal economy, mean[4]	3.21	3.75*
Good for personal health, mean[4]	4.24	3.87*
Simple and convenient, mean[4]	3.69	3.84
Complicated and time consuming, mean[4]	2.10	1.72*
Lack the opportunity, mean[4]	1.58	1.42
Feels good, mean[4]	4.52	4.34
Unnecessary and meaningless, mean[4]	1.36	1.37
Not in line with lifestyle, mean[4]	1.58	1.56

[1] Scale: From 1=Never, to, 5=Always
[2] Scale: From 1=Not important at all, to, 5=Of utmost importance
[3] Scale: From 1=None at all, to, 5=Very large
[4] Scale: From 1=Strongly disagree, to, 5=Strongly agree
[5] Only owners of ethanol/E85 cars were selected
* Statistically significant difference between the 2006 and 2008 groups at $p < .05$

3.10 Other types of pro-environmental behaviours

In addition to measuring clean car owners use of ethanol fuel, nine other pro-environmental behaviours were assessed in 2006 and 2008 over the three groups.

As presented Table 13 recycling paper, glass and tin cans is the most frequently performed behaviour across the groups over the years. Thereafter the purchasing of energy efficient product and saving water and energy follows. The patterns are similar across the groups and the changes in most cases not significant. However, the purchasing of environmentally labelled products has decreased significantly for the BFR and CC groups. Overall, the summated grand mean of all the behaviour shows a slight non-significant change for the Stockholm and BFR sites, and no change for the CC group. The CC group is the one performing relatively more pro-environmental behaviours in both 2006 and 2008 than the other groups.

Table 13: Frequency of pro-environmental behaviours

Frequency of behaviour[1]	Sthlm, 06	BFR, 06	CC, 06	Sthlm, 08	BFR, 08	CC, 08
Recycle, paper, glass, tin cans	4.48	4.46	4.67**	4.59	4.58	4.71**
Buy organically grown food	2.79	2.70	2.90**	2.87	2.61	3.02**
Buy env. labelled products	3.48	3.53	3.79**	3.35	3.28*	3.60**
Save water and energy	3.72	3.64	3.74	3.79	3.76	3.69
Buy energy efficient products	3.95	3.92	4.08	4.12	4.01	4.13**
Invest in ethical/env. mutual funds	1.90	1.81	2.02**	1.74	1.78	1.91**
Choose ecological tourism dest.	1.77	1.70	1.76	1.75	1.67	1.95**
Travel with public transportation	2.93	1.84	2.36**	2.85	1.89	2.42**
Bike or walk instead of car use	3.10	3.29	3.31	3.07	3.20	3.27
Grand mean	**3.13**	**3.00**	**3.20****	**3.15**	**2.99**	**3.20****

[1] Scale: From 1=Never, to, 5=Always
* Statistically significant difference between the 2006 and 2008 groups the $p < .05$
** Statistically significant difference between the CC group and at least one other group at $p < .05$

3.11 Clean cars and other pro-environmental innovations

A question that arose after the data collection in 2006 was whether adopters of clean cars also had adopted other pro-environmental innovations to a higher degree than non-adopters of clean cars. In order investigate this issue both adoption of, and attitude to several different pro-environmental innovations were measured. It was also termed necessary to investigate attitudes to different types of cars and fuel, not just focusing on whether the vehicle was believed to be environmentally friendly or not.

In Figure 3 and Table 14 attitudes toward different types of cars, fuels and classifications are presented. The question asked was: What is your attitude to the following types of cars?

Table 14: Attitudes to different types of clean cars

Pro-environmental innovation and attitude[1]	Sthlm, 08	BFR, 08	CC, 08
Cars that run on petrol only and are classified as clean	3.03	3.15	2.38**
Cars that run on petrol only and are *not* classified as clean	2.78	2.60	2.23**
Cars that run on diesel only and are classified as clean	3.22	3.47	2.97**
Cars that run on diesel only and are *not* classified as clean	2.70	2.47	2.23**
Cars that run partly on ethanol/E85 and are classified as clean	3.64	3.67	4.16**
Cars that run partly on natural gas and are classified as clean	3.66	3.64	3.91**
Cars that run partly on biogas and are classified as clean	3.70	3.69	4.17**
Cars that run partly on biodiesel and are classified as clean	3.57	3.65	3.78
Grand mean	**3.30**	**3.29**	**3.23**

[1] Attitude scale from 1=Negative, to, 5=Positive
** Statistically significant difference between the CC group and at least one other group at $p < .05$

The gathered data clearly shows that the CC group who has adopted clean cars are more positive to all types of alternative fuels such as natural gas and bioethanol. However, it is also notable that the CC group is significantly more negative towards fossil fuel based cars, irrespective whether they are classified as clean or not. All these differences are significant, except for the attitude towards biodiesel cars. On the other hand, there were no statistical differences between the two other BEST-sites Stockholm and BFR.

Figure 3: Attitudes to cars based on fuel type and environmental classification*
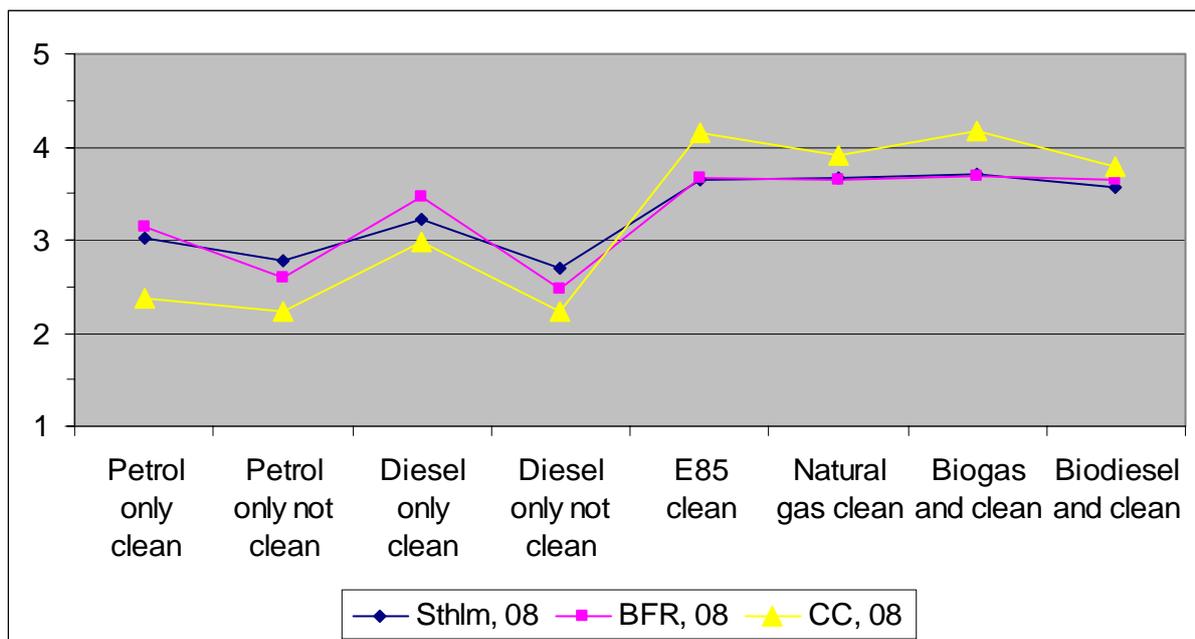
* The figures on the Y-axis represent the attitude scale from 1=Negative, to 5=Positive

In addition to attitudes toward cars of different fuel types, adoption and attitudes to other pro-environmental innovations were also measured. A selection of innovations was done based on current marketing and general debate in environmental magazines and blogs on what innovations are considered pro-environmental. It can also be noted that several of the innovations are among the thirty most important innovation for the last thirty years according to a report by Wharton (2009). For example photovoltaic solar energy ranked 18, large-scale wind turbines 19 and biofuels ranked 25 on the list (internet ranked number one).

In Table 15 the fifteen innovations are listed together with means of adoption and attitudes for each group surveyed in 2008. Adoption was measured on a six-point scale from 1, 'not having considered purchasing at all' to 5 'will absolutely purchase, and then 6, 'have already purchased'. Attitudes were measured from 1 negative to 5 positive.

From the data, it is clear that energy efficient light bulbs, energy efficient refrigerators and freezers, and energy and water efficient dishwashers are the most adopted pro-environmental innovations across the groups. Wind power (own turbine or shares in turbine), solar power and courses in efficient driving (eco driving) are the least adopted pro-environmental innovations. In terms of adoption, there are few statistically significant differences between the three groups. However, the CC group has adopted so-called green electricity to a significantly higher degree, and the same is true for ownership shares in wind power. The CC group has also adopted energy and water efficient dishwashers, energy efficient fridge/freezers, courses in efficient driving/eco driving, and, sorting equipment for recycling to a significantly higher degree than the two BEST-sites. Studying the grand means of adoption of pro-environmental innovations it is clear that the difference in adoption between the two BEST sites is non-significant.

Turning to attitudes to the different pro-environmental innovations the results show that there is a highly positive correlation between adoption and positive attitude across the groups. However, overall there are no statistically significant differences between the three groups in terms of attitudes to the pro-environmental innovations.

Table 15: Adoption and attitude to other pro-environmental innovations

Pro-environmental innovation	Sthlm, 08		BFR, 08		CC, 08	
	Adopt[1]	Att.[2]	Adopt[1]	Att.[2]	Adopt[1]	Att.[2]
Water saving shower heads	3.49	4.01	3.50	4.16	3.83	4.16
Water saving tap heads	3.37	4.13	3.31	4.25	3.52	4.20
Energy efficient lamps	4.81	4.52	4.84	4.61	5.01	4.56
Environmentally labelled electricity such as water or wind power from energy supplier	3.07	4.05	2.84	4.05	3.19**	4.09
Ownership shares in a wind power company	1.70	3.46	1.82	3.65	1.96**	3.53
Personally owned wind power in connection to house or recreational cabin	1.39	3.10	1.46	3.34	1.44	3.16
Geothermal heat pump for house or recreational cabin	2.08	4.04	2.23	4.08	1.99	3.94
Connected to district heating	2.84	3.83	2.55	3.83	2.73	3.93
Solar power for hot water or electricity in house or recreational cabin	2.01	4.40	2.16	4.16	1.98	4.05
Extra insulation	3.07	4.28	3.26	4.41	3.03	4.32
Three plate glass windows	3.81	4.42	4.22	4.60	4.13	4.48
Energy and water efficient dishwasher	3.98	4.61	3.70	4.60	4.21**	4.64
Energy efficient fridge/freezer	4.62	4.68	4.40	4.72	4.72**	4.72
Course in efficient driving/eco driving	1.95	3.19	2.13	3.43	2.35**	3.33
Sorting equipment for recycling	4.45	4.17	4.42	4.26	4.93**	4.34
Grand mean	**3.12**	**4.04**	**3.15**	**4.14**	**3.28****	**4.10**

[1] Adoption scale from 1=Not at all, to, 5=Yes absolutely, 6=Already adopted
[2] Attitude scale from 1=Negative, to, 5=Positive
** Statistically significant difference between the CC group and at least one other group at $p < .05$

Taken together the analysis of the adoption of pro-environmental innovations and the related attitudes show that the CC group in general have adopted to a significantly higher degree and have a

significantly more positive attitude to these innovations as long as it concerns alternative fuels. Otherwise the differences between the Stockholm and BFR sites are small and statistically insignificant and since this measure was not included in the 2006 questionnaire, conclusions on changes over the two years are not possible to draw.

4. Conclusions

Knowledge about consumers' values, attitudes, car replacement intentions and willingness to take pro-environmental action for transportation, is crucial in order to achieve market breakthrough for clean cars and fuels. The main purpose of this report was to give a descriptive account of the findings of the consumer surveys carried out in 2006 and 2008 in the Bio-fuel Region (BFR), in Stockholm (Sthlm) and among owners of clean cars (CC group). Another purpose of this report was to analyse the differences between the clean car owning groups in relation to two best sites. Below the main conclusions are reported.

- The **self-perceived knowledge** of bioethanol increased significantly over the two years in Stockholm and BFR, but not in the CC group. In this sense the awareness of alternative fuels such as ethanol the two BEST-sites is nearing the awareness levels of the CC group. This can be viewed as an indicator of consumers becoming more aware of clean cars overall. According to our results, it can also be concluded that the vast majority of ethanol car owners view ethanol cars as environmentally friendly.

- The **amount of ethanol cars** increased significantly in the CC group from 74 percent to 83 percent, whereas the number of natural/biogas cars decreased from 11 to 5 percent. These changes most likely reflect the fact that during this time Volvo decided to stop marketing its bio/natural gas vehicles. These changes also reflect the fact that the amount of filling stations for ethanol kept increasing, as did the number of makes and models of vehicles possible to fuel with ethanol. Changes in the composition of cars at the Stockholm and BFR sites were too small to be statically significant.

- The amount of people having an **acquaintance owning an ethanol car** rose significantly across the two years, most notably in Stockholm with an increase of 18 percentage points (from 29 to 47). The highest amount of acquaintances owning an ethanol car was found in the CC group of both years.

- Concerning the **usage of the car** for different trips there was a decrease in the usage of car for work trips and work related trips in Stockholm. Otherwise, the usage numbers were stable across the years.

- Overall, the **replacement intentions** for new cars (within six and twelve months) have fallen significantly across all groups. It is likely that this development is related to the worldwide recent economic downturn. The numbers on replacement intentions for different cars in the future show that the demand for cars with powerful engines is falling across all three groups. At the BFR site the replacement intentions for larger cars has also fallen significantly. Across all sites the demand for cars fuelled mainly by petrol has fallen significantly, however the replacement intentions for vehicles fuelled by alternative fuels has not increased significantly. The CC group still has the highest replacement intentions for these types of cars. From the results, the conclusion that future demand for clean cars will increase slightly on a yearly basis seems relevant. Changes over two years are however too small to measure. Nevertheless, the trend towards smaller cars with less horsepower seems currently to be strong.

- When car owners at the different sites evaluate important car **attributes for replacement** it is evident that reliability and safety are highly ranked. However, in the CC group, attributes such as low fuel consumption, environmentally friendliness and the possibility of the car to run partly on ethanol are highly ranked. Compared to similar studies on important attributes for car owners (e.g. Hendrickx and Uiterkamp, 2006) it is somewhat of a breakthrough that low fuel consumption ranks top three together with the classic attributes of reliability, safety and comfort. Thus the manufacturers of clean cars that focus on fuel efficiency and also smaller cars will be well positioned to meet the consumer demand for the future.

- Owners of clean cars perceive their **contribution to different environmental problems** to be less than car owners in Stockholm and BFR. This leads to the conclusion that owners of clean cars believe that they have taken necessary steps to lessen their environmental impact and thus perceive their current cars to be cleaner than the average car owner. In this sense, buying a cleaner car is considered a pro-environmental behaviour that is satisfactory among respondents.

- **Knowledge of alternative fuels,** such as knowledge of the number of filling stations has increased significantly in Stockholm and in BFR. It is also clear the owners of clean cars perceive it to be less expensive to use ethanol in 2008 than in 2006.

- **Environmentally related attitudes** and the endorsement of the ecological beliefs have fallen more at BFR than in Stockholm, however the general trend across all three groups are falling environmental attitudes. This is also in accordance with other studies (Länsförsäkringar, 2008). The CC group had the highest endorsement of the ecological beliefs in 2006, but in 2008, there are no statistically significant differences between the three groups on these types of beliefs.

- The **willingness to take pro-environmental action** among the car owners is in general stable over the two years. However, at the Stockholm and BFR site the willingness to use public transportation and bike/cycle more for short trips has decreased significantly. This is well in line with the similar decrease in ecological beliefs as accounted for above.

- The self-reported frequency of **using ethanol** in flexible fuel vehicles has increased. The amount of effort for this usage and the perception that this behaviour is complicated, have fallen significantly. However, this behaviour is carried out less for environmental reasons in 2008 than in 2006 and more for personal financial reasons. Reasons behind these changes might be that the number of filling stations providing ethanol has increased, and also the fact that the price of ethanol compared with the petrol price has dropped somewhat between the two measuring instances.

- Concerning **other types of pro-environmental behaviours**, the levels are stable across the two years. The CC group report performing more pro-environmental behaviours than the other groups in both 2006 and 2008.

- The CC group, who has adopted clean cars, are **more positive to all types of alternative fuels** such as natural gas and bioethanol compared to the two BEST-sites. However, it is also notable that the CC group is significantly more negative towards fossil fuel based cars, irrespective whether they are classified as clean or not.

- Finally, the CC group has adopted significantly more **pro-environmental innovations** such as 'green' electricity energy efficient dishwashers, and, courses in eco-driving. However, concerning the attitudes to these types of innovations the levels are similar across the groups.

Appendix 1: Questionnaire items

Questionnaire items and sections relevant for this report are presented below. The survey was carried out in Swedish. To save space the questionnaire below has been compressed.

Background factors

- Are you female or male?
  - Female, Male
- What year where you born?
  - Exact year
- How many years of schooling have you completed in total?
  - Less than 9 years, Between 9 and 12 years, More than 12 years
- Have you graduated from university?
  - Yes/No
- Are there children in your household below the age of 18?
  - Yes/No
- What is your current living status?
  - Co-habitating/married, Living alone
- What is your current employment status?
  - Working full time as employee, Working part time as employee, Self-employed in own business, Studying, Household work in home, Unemployed, Retired, Sick-listed
- What is your annual income (including benefits and allowances) before taxes?
  - < 10 000 Euro, 10 000 - 20 000, 20 000 - 30 000, 30 000 - 40 000, 40 000 - 50 000, > 50 000

Car and usage

- What different types of fuels for private cars do you know about? Indicate all alternatives.
  - Petrol, Diesel, Bio-diesel, Electric power, Natural gas, Bio-gas, Ethanol
- How many private cars does your household have access to?
  - 1, 2, 3, > 3
- How would you classify your car on size?
  - Small sized car, Medium sized car, Big sized car, SUV or minivan
- What is your driving distance per year for your main car?
  - <10 000 km, 10 000-20 000, 20 000-30 000, >30 000
- How would you classify your main car in terms of environmental friendliness?
  - Standard car, Environmentally friendly car, Don't know
- What fuel does your car run on mainly? (one alternative)
  - Petrol, Diesel, Flexi-fuel (E85 and petrol), Hybrid (electricity and petrol), Bi-fuel (natural/biogas and petrol), Ethanol-hybrid (electricity and ethanol)
- During the last year, I have (multiple alternatives – Yes, No on each)
  - Travelled with in a car fuelled by an alternative fuel?
  - Driven a car fuelled by ethanol/E85?
  - Watched the film An Inconvenient truth by/with Al Gore?
  - Participated in a workshop concerning cars, fuels, oil, biofuels and/or energy?
  - Participated in a course on fuel efficient driving/eco driving?
  - Signed a petition or name list to influence politicians to lower the price on petrol?
- What do you use your main car for? Please indicate how often you use your car for the following trips. (From 1 Never, to 6 More than 5 times per week)
  - The car is used for trips to and from work and/or school
  - The car is used for trips on the job
  - The car is used for shopping trips
  - The car is used for leisure travel and other types of trips

Replacement intentions

- How likely is it that you will replace your current car… (From 1 Not likely at all, to 5 Very likely)
  - Within 6 months
  - Within 12 months
  - For a larger car
  - For a smaller car
  - For a car with more horse power
  - For a car with less horse power
  - For a so called environmentally friendly car
  - For a car fuelled manly with petrol
  - For a car fuelled mainly with diesel
  - For a car fuelled mainly with ethanol/E85
  - For a car fuelled mainly with electricity/hybrid
  - For a car fuelled mainly with gas (natural/biogas)

- What is important for you when considering a replacement of your car? That the car under consideration is…
  - Mid sized
  - Small sized
  - Big sized
  - Has powerful engine
  - Collision safe
  - Factory new
  - Fuel efficient
  - Good accelerating power
  - Good road handling
  - Possible to use in terrain
  - Can pull camper trailer
  - Small emissions of CO_2
  - Automatic gear shift
  - Extra equipped with for example climate control or trip computer
  - Highly reliable
  - Four wheel drive
  - High second-hand value
  - Gives driving pleasure
  - Sporty interior
  - Comfortable for driver
  - Low insurance, repair and service costs
  - Low purchase price
  - Gives luxury feeling
  - Comfortable for passengers
  - Good loading capacity
  - Sporty look
  - Easy to fill up/refuel
  - Easy to park
  - Fast on highway
  - As environmentally sound as possible
  - Sticks out design-wise
  - Carries more than four passengers
  - Gives an economic cash-back incentive (for example 10,000 SEK) from the state when purchased
  - Runs partly on ethanol/E85
  - Runs on ethanol/E85 only
  - Runs on gasoline only
  - Runs on diesel only
  - Runs partly on bio/synthetic diesel
  - Runs on electricity only
  - Runs partly on electricity/hybrid
  - Runs partly on bio/natural-gas
  - Runs on bio/natural-gas only
  - In accordance with lifestyle

Perceived knowledge of ethanol/E85

- o How certain are you that the following statements are true or false? (From 1 Fully certain it is true, 3 Unsure if true or false, to 5 Fully certain it is true)
  - o Ethanol, that can be used for cars in Sweden, consist of 85 % ethanol and 15 % petrol
  - o A car fuelled by ethanol is harder to start at degrees below zero
  - o In Sweden today there are about ten filling stations for ethanol (E85)
  - o Today there is only one manufacturer of cars that run on ethanol/E85 mainly
  - o So called flexifuel vehicles are fuelled by ethanol and have two fuel tanks
  - o Calculated on kronor per 10 kilometres, it is more expensive to drive on ethanol than petrol
  - o When leaking, ethanol is worse for the environment than ordinary petrol

Attitudes and beliefs about cars, traffic and the environment

- o What do you think about your car usage and the environment? (From 1 Strongly disagree, to 5 Strongly agree)
  - o Your car travelling has a negative effect on the environment
  - o Your car travelling has a negative effect on the landscape in that roads and parking lots are built
  - o Your car travelling disturbs animals and humans due to noise
  - o Your car travelling has a negative effect on your own health
  - o Your car travelling has a negative effect on other peoples' health
  - o Your car travelling is expensive for you in the form of insurances and other fees
  - o Your car travelling is expensive for you in the form of expensive fuel
- o Indicate to what extent you agree or disagree with the following statements: (From 1 Strongly disagree, to 5 Strongly agree)
  - o I feel that it is important to travel by car using fossil fuels, oil/petrol/diesel, as little as possible
  - o I feel morally responsible to conserve oil/petrol/diesel, no matter what other people do
  - o I would be a better person if I used electricity or an alternative fuel for my car
  - o People like me should do everything they can to reduce their use of fossil fuels such as oil/petrol/diesel
  - o I feel morally responsible to use electricity or alternative fuels instead of oil/petrol/diesel
- o New Ecological Paradigm (NEP). Indicate to what extent you agree or disagree with the following statements: (From 1 Strongly disagree, to 5 Strongly agree)
  - o We are approaching the limit of the number of people the earth can support
  - o Humans have the right to modify the natural environment to suit their needs
  - o When humans interfere with nature it often produces disastrous consequences
  - o Human ingenuity will insure that we do NOT make the earth unliveable
  - o Humans are severely abusing the environment
  - o The earth has plenty of natural resources if we just learn how to develop them
  - o Plants and animals have as much right as humans to exist
  - o The balance of nature is strong enough to cope with the impacts of modern industrial nations
  - o Despite our special abilities humans are still subject to the laws of nature
  - o The so-called "ecological crisis" facing humankind has been greatly exaggerated
  - o The earth is like a spaceship with very limited room and resources
  - o Humans were meant to rule over the rest of nature
  - o The balance of nature is very delicate and easily upset
  - o Humans will eventually learn enough about how nature works to be able to control it
  - o If things continue on their present course, we will soon experience a major ecological catastrophe

- General technology optimism. Indicate to what extent you agree or disagree with the following statements: (From 1 Strongly disagree, to 5 Strongly agree)
  - The latest technology gives me control over my life
  - I prefer to use the latest technology available
  - The latest technology stimulates my thinking
  - The latest technology gives me freedom
  - It is fun to learn more about the latest technology
- Environmental technology optimism. Indicate to what extent you agree or disagree with the following statements: (From 1 Strongly disagree, to 5 Strongly agree)
  - The latest technology will solve the environmental problems we face today
  - The current technology has greatly improved the environment so far
  - Humans will invent new technology that will make us less dependent on the natural environment
  - New innovations will improve the environment
  - I am optimistic about the new technology in the future
  - When environmental catastrophes occur the latest technology will solve the problems
  - The latest technology will have a more positive than negative impact on the environment in the future
  - The latest technology will solve the environmental problems that might occur in the future

Willingness to take pro-environmental action

- Indicate to what extent you agree or disagree with the following statements: (From 1 Strongly disagree, to 5 Strongly agree)
  - Decrease car use on shorter trips
  - Decrease car use on longer trips
  - Car-pool more to work/school
  - Drive slower on free/highways
  - Drive more fuel efficient/eco-drive
  - Travel by public transportation more instead of car use
  - Go by train more instead of flying when possible on longer trips
  - Bicycle or walk on shorter trips in the summer
  - Bicycle or walk on shorter trips in the winter
  - Choose a more environmentally friendly car the next time you replace your car
  - Choose a more fuel efficient car the next time you replace your car

Frequency and reason for using ethanol/E85

- What is your opinion on using the alternative fuel ethanol/E85?
  - Frequency of ethanol/E85 use (From 1=Never, to, 5=Always)
  - Importance (From 1=Not important at all, to, 5=Of utmost importance)
  - Amount of effort (From 1=None at all, to, 5=Very large)
  - Good for the environment (From 1 Strongly disagree, to 5 Strongly agree)
  - Good for personal economy (From 1 Strongly disagree, to 5 Strongly agree)
  - Good for personal health (From 1 Strongly disagree, to 5 Strongly agree)
  - Simple and convenient (From 1 Strongly disagree, to 5 Strongly agree)
  - Complicated and time consuming (From 1 Strongly disagree, to 5 Strongly agree)
  - Lack the opportunity (From 1 Strongly disagree, to 5 Strongly agree)
  - Feels good (From 1 Strongly disagree, to 5 Strongly agree)
  - Unnecessary and meaningless (From 1 Strongly disagree, to 5 Strongly agree)
  - Not in line with lifestyle (From 1 Strongly disagree, to 5 Strongly agree)

Other types of pro-environmental behaviours

o Indicate in which frequency you perform the following behaviours (From 1=Never, to, 5=Always)
  o Recycle, paper, glass, tin cans
  o Buy organically grown food
  o Buy environmentally labelled products
  o Save water and energy
  o Buy energy efficient products
  o Invest in ethical/environmentally labelled mutual funds
  o Choose ecological tourism destination
  o Travel with public transportation
  o Bike or walk instead of using the car

Attitude to different types of clean cars

o What is your attitude to the following types of cars? (From 1 Negative, to 5 Positive)
  o Cars that run on petrol only and are classified as clean
  o Cars that run on petrol only and are *not* classified as clean
  o Cars that run on diesel only and are classified as clean
  o Cars that run on diesel only and are *not* classified as clean
  o Cars that run partly on ethanol/E85 and are classified as clean
  o Cars that run partly on natural gas and are classified as clean
  o Cars that run partly on biogas and are classified as clean
  o Cars that run partly on biodiesel and are classified as clean

Adoption of, and attitude to other pro-environmental innovations

o Which of the following products do you have, or have you thought of acquiring? (From 1 No, not at all, to 5 Absolutely, 6 Already have)
  o Water saving shower heads
  o Water saving tap heads in kitchen and bathroom
  o Energy efficient lamps
  o Environmentally labelled electricity such as water or wind power from energy supplier
  o Ownership shares in a wind power company
  o Personally owned wind power in connection to house or recreational cabin
  o Geothermal heat pump for house or recreational cabin
  o Connected to district heating
  o Solar power for hot water or electricity in house or recreational cabin
  o Extra insulation
  o Three plate glass windows
  o Energy and water efficient dishwasher
  o Energy efficient fridge/freezer
  o Course in efficient driving/eco driving
  o Sorting equipment for recycling

- What is your attitude to the following types of products? (From 1 Negative, to 5 Positive)
    - Water saving shower heads
    - Water saving tap heads in kitchen and bathroom
    - Energy efficient lamps
    - Environmentally labelled electricity such as water or wind power from energy supplier
    - Ownership shares in a wind power company
    - Personally owned wind power in connection to house or recreational cabin
    - Geothermal heat pump for house or recreational cabin
    - Connected to district heating
    - Solar power for hot water or electricity in house or recreational cabin
    - Extra insulation
    - Three plate glass windows
    - Energy and water efficient dishwasher
    - Energy efficient fridge/freezer
    - Course in efficient driving/eco driving
    - Sorting equipment for recycling

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