

Measure title: **Car Sharing for business and private persons, Sun fleet**

City: **Malmö**

Project: **SMILE**

Measure number: **9.1**

A Introduction

Despite Sweden's reputation for being an environmental pioneer, at present the average age among private vehicles (cars) in Sweden is one of the oldest in the EU. Some people in Sweden see no other alternatives to the private car for commuting, errands and recreation. Even if many citizens, companies and organization could consider not having their own car, alternatives or a combination of alternatives need to be developed. New forms of car ownership and accessibility are one such alternative.

Air quality norms in parts of central Malmö are exceeded from time to time. The City of Malmö is under pressure from the regional environmental authorities to reduce the number of days and hours per year when the norms are exceeded. The primary cause of the air pollution is traffic. A variety of measures may be required to achieve air quality goals with respect to traffic. One such measure is 9.1 which introduced the commercial service of car sharing in Malmö. Through car-sharing, habitual motorists may drive less and those who cannot afford a car can have occasional access to a car at a reasonable and competitive price.

In Malmö previous experience with car-sharing has been limited, but this is changing because of 9.1. This particular measure is important for developing a transport system where citizens are not dependent on traditional private car ownership for all of their mobility. Sunfleet established five car sharing locations in Malmö, available for all kind of users.

The evaluation is an important part of this measure since car-sharing in Sweden is not as common as in some other countries in Europe (in particular: Switzerland, Germany). It is important to identify the different kind of users, the decision-making factors between the car pool and other forms of transport, and how the car pool should be organized. There are few car sharing systems in Europe that contain only "clean" vehicles. In SMILE this measure functions as a European demonstration of car sharing with a strong "clean vehicle" component.

A1 Objectives

The aim is to provide people, companies and organizations in Malmö access to environmentally sound vehicles and flexible transport – wherever and whenever needed. Car-sharing is similar to having access to your own car - without owning one (and is also known as 'car clubs', particularly when applied to private individuals only). Specifically this measure aimed to establish five car-sharing sites in the city of Malmö for different kinds of users. Originally the detailed measure plan for this measure called for a mixture of open and closed car-sharing sites. Open sites would be open to the general public and households could join these sites. Closed sites were envisaged as used by companies and organizations and thus not open to the general public. Another aim was that 40% of fuel used in the vehicles would be alternative (i.e. ethanol, biogas) after 18 months, increasing to 50% after 24 months. The measure objectives are:

- **Objective 1:** Change fuel mix used from petrol to more environmentally clean fuel
- **Objective 2:** Change of transport behaviour, i.e. use of car-sharing cars
- **Objective 3:** Awareness and acceptance of the ecological car-sharing concept
- **Objective 4:** Improved safety

- **Objective 5:** Social equity in car use
- **Objective 6:** Marketing/ dissemination
- **Objective 7:** Change of transport behaviour among private persons
- **Objective 8-12:** to form five car sharing sites in Malmö city with a total of 15 cars.

A2 Description

No commercial car-sharing alternatives existed in Malmö prior to SMILE. Five car-sharing sites with a total of 15 cars for all kind of users (public and private companies, private users as well as other organizations) were established by the end of 2007. Almost all cars are clean vehicles, i.e. can run on fuels other than petrol (the exception being some petrol fuelled ‘super minis’).

All five sites are located in the central parts of Malmö. One of the sites is located next to the Central Station, which is interesting for a possible partnership with Skånetrafiken (Regional Transit Authority). By letting all users access all car sharing sites the chance of availability increases and it also creates more possibilities for the use of the cars and for the car sharing business to succeed.

At each site Sunfleet attempted to offer cars with different alternative fuels in response to customer preference. This means that sites have different car models and of varying sizes. The system for unlocking/locking the door uses the subscriber’s mobile phones or text messages. Another alternative is to use smartcards of the type used on public transport. This latter option was investigated but not implemented during the project.

B Measure implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- **New organizational arrangements or relationships, regionally** - There were no commercial car-sharing alternatives in Malmö prior to SMILE. This measure is of importance in developing a transport system where the citizens are independent of private car ownership. There are few car-sharing systems in Europe that contains only clean vehicles. The measure can be used for benchmarking when other commercial car sharing schemes in Europe consider a switch to cleaner vehicles as part of their fleet.
- **New mode of transport exploited, locally** – Sunfleet is Europe’s first environmentally sound car-sharing system. The entire Sunfleet fleet consists of biofuel/flexifuel cars, electric hybrids and gas-hybrid cars. The advanced technology behind the Internet booking interface and the database administration management is owned and operated by Sunfleet. A unique telematic device is installed in every vehicle, enabling a wireless link between cars, cell-phones and the Sunfleet database server.

B2 Situation before CIVITAS

Prior to SMILE there was only one private car-sharing club situated in Malmö. The club had two conventionally powered cars. Some time ago an attempt at establishing an electric powered car sharing club in the Augustenborg neighbourhood was made but this was not successful. There were no commercial car-sharing alternatives in Malmö before SMILE and in this respect Malmö has lagged behind Stockholm and Göteborg (the 1st and 2nd largest cities in Sweden) where car-sharing is more successful and where commercial operators have several years of experience.

B3 Actual implementation of the measure

The measure was implemented as follows (activities up and until establishment of 5th car-sharing site):

Table 1: Development of 9.1 Including Each Site that is Part of SMILE.

Project planning by Managing Director	1.2.05	30.4.06
Budget – as project started – by Man.Dir.	1.2.05	
Development of ideas – continuous through out the project depending on happenings	1.4.05...	
New employee, project mgr and sales rep in Malmö	1.2.06	
Find customer for pool 1-2. Continuous through out the project...	1.9.05	
Order cars pool 1	1.2.06	
Parking places & signs pool 1	1.3.06	
Car delivery	1.3.06	
Installation cars	1.4.06	
Surveys – started spring 2007	1.15.07	
Customer into systems – continuous through out the project. See separate column.	1.03.06	
User education – continuous through out the project	1.04.06	
Pool nr 1 started	1.4.06	
Planning pool 2	1.12.05	
Order cars	1.2.06	
Parking places & signs pool 2	1.4.06	
Car delivery	1.4.06	
Installation cars	1.5.06	
Surveys – started spring 2007	1.15.07	
Customer into systems – continuous through out the project. See separate column.	1.03.06	
User education – continuous through out the project		
Pool nr 2 started	1.5.06	
Planning pool 3	1.11.06	30.4.07
Order cars pool 3	1.2.07	
Parking places & signs pool 3	1.3.07	
Car delivery	1.3.07	
Installation cars	1.4.07	
Surveys – started spring 2007		
Customer into systems – continuous through out the project. See separate column.	1.03.06	
User education – continuous through out the project		
Pool nr 3 started	1.4.07	
Planning pool 4	1.11.06	
Order cars pool 4	1.2.07	
Parking places & signs pool 4	1.3.07	
Car delivery	1.3.07	
Installation cars	1.4.07	
Surveys – started spring 2007		
Customer into systems – continuous through out the project. See separate column.		
User education – continuous through out the project		
Pool nr 4 started	1.4.07	
Planning pool 5	1.02.07	31.12.07
Order cars pool 5	1.10.07	
Parking places & signs pool 5	1.12.07	
Car delivery	1.12.07	
Installation cars	13.12.07	
Surveys – started spring 2007		
Customer into systems – continuous through out the project. See separate column.		
User education – continuous through out the project		
Pool nr 5 started	13.12.07	

Figure 1: The Locations of the Car-Sharing Sites in Malmö that were Established 2005-2007.
 The locations are from the left to the right: WTC, Västra Hamnen, Centralen, Caroli, Anna.

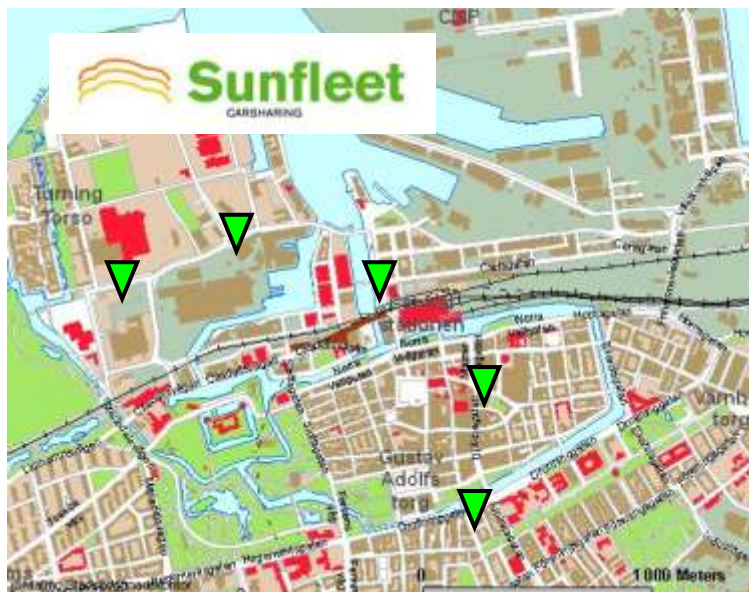


Table 2: Development of 9.1 in Terms of Cars, Sites, Users from March 2006 to April 2008

Note: Corporate customers counted only quarterly.

Month	Cars	Pool sites	Private users	Company users.
03/2006	0	0	1	4
04/2006	1	1	4	4
05/2006	4	2	5	4
06/2006	4	2	5	18
07/2006	4	2	7	18
08/2006	4	2	13	18
09/2006	4	2	15	18
10/2006	4	2	16	18
11/2006	5	2	20	18
12/2006	5	2	21	42
01/2007	5	2	22	42
02/2007	5	2	22	42
03/2007	5	2	26	42
04/2007	7	4	28	42
05/2007	7	4	39	42
06/2007	7	4	53	55
07/2007	7	4	66	55
08/2007	5	4	71	55
09/2007	9	4	78	55
10/2007	15	4	82	55
11/2007	15	4	90	55
12/2007	15	5	90	90
01/2008	15	5	93	90
02/2008	15	5	97	90
03/2008	15	5	103	90
04/2008	15	5	112	111

Figure 2: Development of 9.1 in Number of Cars and Sites in Malmö, March 2006-April 2008

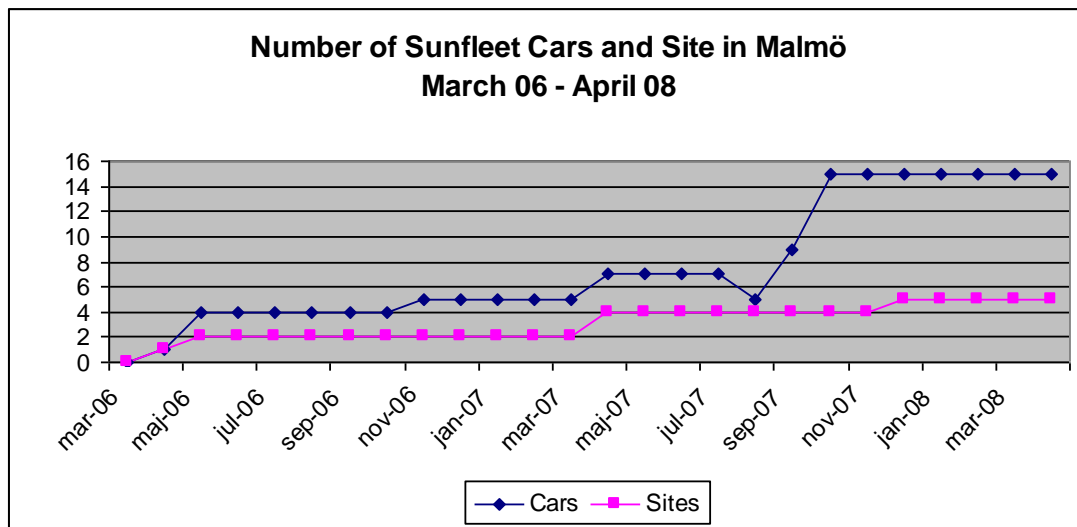


Figure 3: Cars Models and Intended Fuel Use at Sites during SMILE.



Figure 4: Development of 9.1 as Expressed by Membership in the Car-Sharing Scheme.

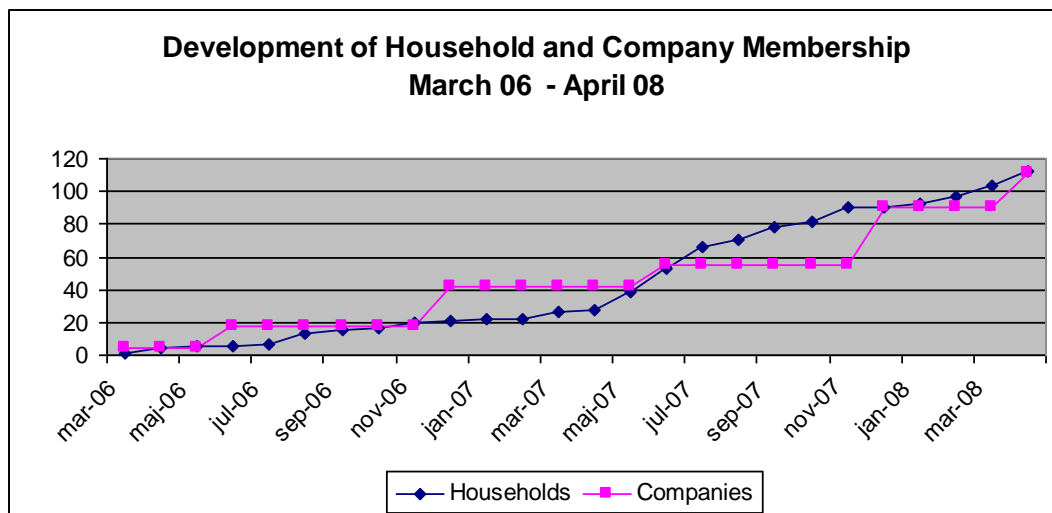
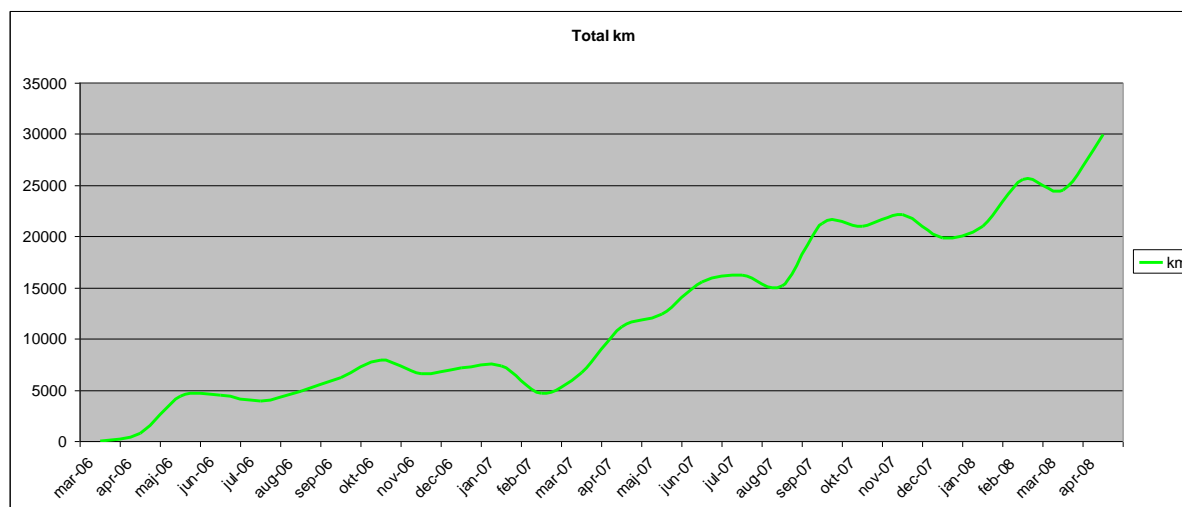


Figure 5: Development of 9.1 in Terms of Kilometres Driven per Month, March 2006-April 2008**Table 3: Important Marketing and Sales Activities during the 9.1 Measure**

08.2005	Starting sales work by contacting companies. Done by Managing Director
09.2005	Big promotional meeting w 50 potential customers from different companies
09.2005-01.2006	Continuous sales work by Managing Director
02.2006	Hires Sales and Project manager no 1. Sales work continues
3.2006-5.2006	2 promotion and information meetings during spring 2006 to win new customers/ companies. Sales work continues.
6.2006-8.2006	Sales and Project manager no 1 quits. No sales work for 3 months
8.2006	Sales and Project manager no 2 hired
9.2006	Participated at Malmö City's own "Sustainable Transportation in the City -day" . Sales work continues
10.2006	Participated at Malmö Högskola/ Sustainable Mobility - exhibit in October 2006.
11.2006-02.2007	Sales work continues
03.2007	Sales and Project manager No 3 is hired - no 2 quits.
03.2007	A project coordinator consultant is hired part time to release more time for sales work
03.2007-08.2008	Ads in "Malmömagasinet" will run at 7 different occasions from March through August 2007
04.2007	Ad in "Sydsvenska Affärer – Big regional news paper
05.2007	2 weeks of out-door exhibition, Information activities about the car sharing concept down town Malmö.
09.2007	Ad in Dagens Industri. (huge business news paper)
10.2007	Promotional meeting w 30 potential customers
11.2007	Promotional activity handling out flyers to potential private users in the inner city
04.2008	Promotion- and information mail activity and electronic survey, about car sharing in general, towards locals in the inner city. Activity done in cooperation with HM Skåne.

B4 Deviations from the original plan

The deviations from the original plan comprised:

- **Deviation 1 Mix of users** – The original plan to lock certain users to separate car sharing sites (to better be able to measure the behaviour of that certain users) was changed. Sunfleet has discovered that it is a much better economic and practical solution for both Sunfleet and its users to let all kinds of users use all cars at all sites. Car availability increases for all customers, cars are used more often and fixed costs are recovered faster through the greater usage of the cars. This led to lower costs and more competitive prices.
- **Deviation 2 Timetable** – During the project Sunfleet lost key personnel several times both locally and at the national office. Therefore the project lost speed. Sunfleet also had to replace the technology (the telematic boxes) in all cars because the original supplier could not meet growing demands. The carsharing sites were not established according to the original timetable. The last site was established in December 2007.
- **Deviation 3 Improve use of alternative fuel** – Since the project lost both personnel and speed, the attempt on behalf of Sunfleet to get the users to use more clean fuel was started late and therefore generated less change among the users and their fuel buying habits (as all the cars have the potential to use gasoline or the clean fuel). This was one of the objectives stated in the Inception report.
- **Deviation 4 – Average occupancy** - There is no data recorded how many persons travel in the car each time. In the original plan for the measure and its evaluation, high levels of vehicle occupancy were goals. Since both Corporate and private users of Sunfleet's cars have not been very helpful in responding to surveys, even if questions had been asked about occupancy the responses would probably have been too few to be able to make definitive conclusions. This means that indicator 28 is not included in the technical evaluation.

B5 Inter-relationships with other measures

In the original SMILE application this measure was not related to other measures. During the measure the “Managing Director nr 2” has been in contact with Skånetrafiken about potential collaboration. In the early part of the measure the technical evaluation staff tried to get representatives of Skånetrafiken and Sunfleet to participate in impromptu meetings as part of local SMILE partner events.

C Evaluation – methodology and results

C1 Measurement methodology

C1.0 Data collection methodology and time cut-off points

Data for the evaluation of this measure has been collected in three main ways:

1. Questions have been asked about car pools in the General Public Survey as part of the technical evaluation in Malmö. Depending on the question, between 1811 and 1915 responses were received.
2. Staff at Sunfleet, particularly the second manager in Malmö, has very diligently attempted to collect data concerning car usage, fuel usage and km driven for every car at every site. This has not always been easy since Sunfleet is not a separate legal entity and therefore cars have been rotated in/out of Sunfleet without Sunfleet having all of the statistics that would have been helpful. In these cases, the evaluators have chosen to keep these statistics out of the evaluation for fear of incomplete or incorrect data influencing the results.
3. The technical evaluation staff and/or employees at Sunfleet have interviewed or surveyed users, corporate representatives and/or attempted to get individual households to complete a travel diary and questionnaire in an attempt to establish a baseline, business as usual scenario, and gauge actual change at the individual level.

Time cut-off: Since real progress on the measure commenced during 2006, the evaluation does not include 2005. *Unless otherwise specifically stated, all evaluation data and results are for all five car-sharing sites. In case of deviations from this the reader is alerted to such matters in the text.* The general cut-off point for data collection for this measure is April 2008 which coincides with a switch in measure leaders and is approximately two years after the start of the first car-sharing site..

C1.1 Impacts and Indicators

Table 4: Table of Indicators used in the Evaluation of this Measure

Nr.	RELATES TO GUARD	INDICATOR NAME	DESCRIPTION	DATA /UNITS
3		Vehicle fuel efficiency	Fuel used per vkm, per vehicle type	MJ/vkm or similar, derived
4		Fuel mix	Change in fuel usage in the measure	Absolute values or percentage
8		CO ₂ emissions	CO ₂ per vkm	G/vkm, derived
10		NO _x emissions	NO _x per vkm	G/vkm, derived
11		Small particulate emissions	PM10 per vkm	G/vkm, derived
13		Awareness level	Awareness of the general public about the existence of car pools in Malmö in general and Sunfleet in particular.	Survey
14		Acceptance level	Opinion survey of general public about attitudes to car pools	Survey
MSE-20	14	Attitude change	In the case of "corporate car pools" attitudes towards car sharing on the part of company managers/other representative	Qualitative description
MSE-21	1	Operating Revenues	Revenues per car sharing scheme (i.e. per car pool)	Quantitative, measurement
MSE-22	2	Operating costs	Costs per car sharing scheme (i.e. per car pool)	Quantitative, measurement
MSE-23	26/27	Shift in travel habits, previously owned a car	People who owned a car prior to joining, how have their travel habits changed.	Nr of trips in each mode and/or derived pkm for each mode
MSE-24	26/27	Shift in travel habits, those who didn't own a car	People with no cars prior to joining, how have their travel habits changed.	Nr of trips in each mode and/or derived pkm for each mode

Detailed description of the indicator methodologies:

- **Indicator 3** (Vehicle fuel efficiency) – Statistics for each vehicle, where available, could have been used to attempt to determine fuel efficiency for the entire fleet of cars in Malmö. However, we do not know the vehicle fuel efficiency for the vehicles used prior to a household joined Sunfleet or the efficiency in vehicles used by a company prior to joining Sunfleet.
- **Indicator 4** (*Fuel mix*) – This indicator shows the mix of petrol, ethanol (E85) and natural gas/biogas used in the vehicles. The goal of the measure has been that this mix should shift away from petrol as the measure progresses.
- **Indicator 8** (CO₂ emissions) – This derived indicator shows the effects of changes in the fuel mix resulting in lowered CO₂ emissions. Further, with a shift in driving habits with fewer km driven, this indicator should fall.
- **Indicator 10 and 11** (NO_x and PM10) – This derived indicator should fall with a shift in driving habits with fewer km driven.
- **Indicator 13 and 14** (Awareness and acceptance) – This indicator shows how the general public's awareness and acceptance of car sharing changes during the measure. Numbers from the SMILE General Public Survey from the spring of 2007 plus the survey conducted by Malmö city in autumn 2003 are used in comparison.
- **Indicator MSE-20** (Attitude change) – This is an estimation of how corporate users/companies have judged changes in car usage and how their opinions about car-sharing have changed during the measure.
- **Indicator MSE-21** (Operating revenues) – This is calculated per car sharing sites 1-5.
- **Indicator MSE-22** (Operating costs) – This is calculated per car sharing sites 1-5. Staff costs and similar are kept out this indicator since staff have been responsible for other matters in Sunfleet outside of Malmö.
- **Indicator MSE-23 and MSE-24** (Shifts in travel habits) – This is estimated based on the questionnaires directed to the private (household) users.

C1.2 Establishing a baseline

Depending on the indicator in question, different kinds of baseline situations or data make up a constructed baseline.

- Indicator 3: we cannot know this for sure, it is difficult to ask potential members of the car-sharing site about this prior to their consideration of participating in Sunfleet. Furthermore, too many questions at such an early stage might "scare customers away" according to Sunfleet.
- Indicators 4, 8, 10, 11: we can assume that vehicles subscribers used before joining Sunfleet ran 100% on petrol (remembering that diesel is not very common in Sweden due to the cold weather and a traditional of not using diesel fuel) and derive/estimate emissions.
- Indicators 13 & 14: we can use the travel survey conducted 2003 as a baseline and in particular the responses of the general public about car-sharing. However, there are reasons to believe that the figures from 2003 are misleading and difficult to compare with the General Public Survey in SMILE from 2007 (this matter is returned to later in this report.)
- Indicator MSE20: we can get a sense of this from the results of the interviews.
- Indicators MSE21 and MSE22. Since there was no Sunfleet activity in Malmö prior to SMILE there is no baseline revenue and costs for Sunfleet.

- Indicators MSE23 and MSE24: This is established among private/household customers during their start-up in Sunfleet when they are asked about their travel habits prior to joining Sunfleet. However the response rate has not been as great as hoped.

A baseline is the situation before the start of a particular SMILE measure. For 9.1 the start of the measure can be effectively dated to March 2006 when the first subscribers joined or April 2006 when the first vehicle was on site. However, as the measure has progressed, more and more subscribers have been using more and more vehicles at the original and newer car-sharing sites. The identification of the precise extent of the baseline becomes a question of some sort of cut-off point in time for the measure. How many people and businesses should be part of the baseline will, therefore, vary depending on which point in time is used as a reference point.

Since one of the objectives of the measure is to establish five car-sharing sites, this would mean that the cut-off time and this reference point for establishing the number of users who should be included in a baseline is December 2007 which was the month of the establishment of the five sites.

However, since we have good data up until April 2008 we will use this as the cut-off point for the establishment of the baseline framework. This means that the *estimated* travel by households and companies that were members of Sunfleet in Malmö during April 2008 is what lies as the foundation of the baseline, *where possible*. Furthermore, not all members remain members of Sunfleet during the entire period up to and including April 2008: households can move away from Malmö, companies and households can cease being members for other reasons.

Obviously with more members in January 2009, when SMILE ends, the extent of the baseline would be greater but this would require completion of the evaluation after the end of SMILE.

C1.3 Building the business-as-usual scenario

If there was no Sunfleet established in Malmö, what would the situation look like today for those households and companies who are subscribers to Sunfleet's services?

It is possible that another commercial actor might have established some car-sharing sites. It is also possible that groups of households would have started private sites. It is impossible to be certain whether this would have happened or not.

For the purposes of this evaluation we will assume that any such initiatives would not be as successful as that undertaken by Sunfleet. We will assume, therefore, that the business-as-usual would have been the same travel habits and vehicles used prior to SMILE and the start of the measure.

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport. As previously mentioned in section C1.0 and C1.1 only sites 1-4 are included in some cases.

C2.1 Economy

The indicators for costs and revenues concern the physical operating costs and the revenues accrued. Costs for personnel are not included per se as a separate item. This is because personnel involved in Sunfleet in Malmö have also worked for the establishment of car-sharing in other places in Skåne and because staff members in the national office have assisted

the manager in Malmö. Furthermore, local staff members at Hertz have also provided occasional assistance.

Each site has different costs for parking. Among the fixed, one time costs are those for installation of the telematics, affixing the logotype, sign showing that parking space is reserved for Sunfleet, etc

Operating costs are the costs for the vehicle and the fuel as well as recurring costs required for successful operation, including for example a periodic car wash. Operating revenues include revenues from the subscription by users plus the revenues from the use of each car per time unit and km driven. Operating costs and revenues are displayed for each site in table form and then in summed form for the entire measure in a graph.

Table 5: Operating Revenues and Costs for each Site and Entire Measure March 06-April 08

	Centralen	Västra Hamnen	Anna	Caroli	WTC	TOTAL
Vehicle revenue	342 132 SEK	387 902 SEK	330 774 SEK	115 984 SEK	127 016 SEK	1 303 808 SEK
Subscription revenue	67 475 SEK	75 041 SEK	69 042 SEK	36 139 SEK	22 676 SEK	270 373 SEK
Operating Revenue	409 607 SEK	462 943 SEK	399 816 SEK	152 123 SEK	149 692 SEK	1 574 181 SEK
Installation cost	26 000 SEK	21 000 SEK	29 000 SEK	12 000 SEK	13 000 SEK	101 000 SEK
Vehicle use cost	315 335 SEK	304 726 SEK	310 472 SEK	154 757 SEK	87 285 SEK	1 172 575 SEK
Operating Cost	341 335 SEK	325 726 SEK	339 472 SEK	166 757 SEK	100 285 SEK	1 273 575 SEK
Result	68 272 SEK	137 218 SEK	60 344 SEK	-14 634 SEK	49 407 SEK	300 607 SEK
Months in operation	25	24	13	13	5	N/A

MSE-21 is 1,574,181 SEK for the period under study. If present trends continue Sunfleet in Malmö by the end of SMILE may have revenues of 200 000 SEK/month. MSE-22 is 1,273,575 SEK for the same period. Future costs are more difficult to estimate. At some point costs may have to increase (additional cars) to be able to provide enough services which can then lead to increased revenues. This cannot be predicted given the present evaluation methodology.

Figure 6: Graphic Representations of MSE-21 (operating revenues) as Expressed in Thousands of SEK during the Period March 2006-April 2008.

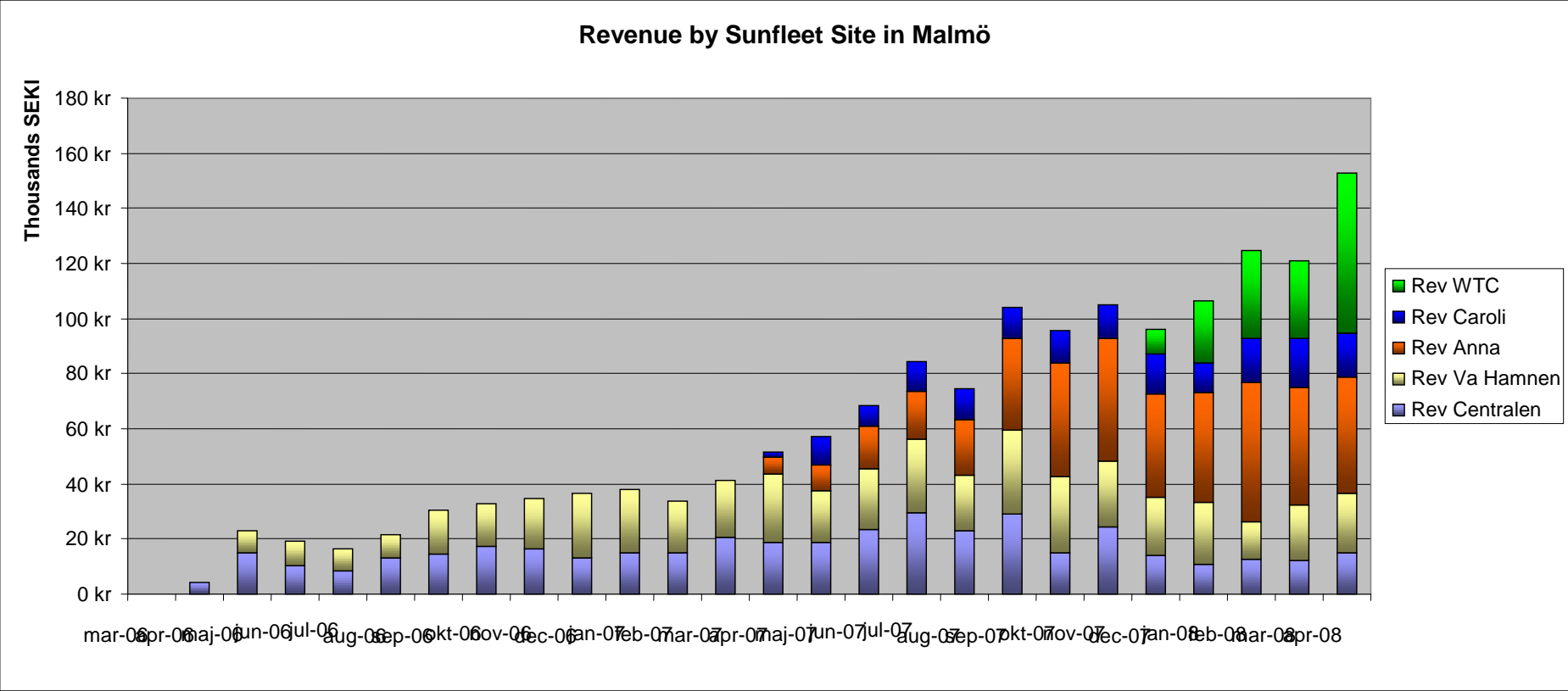


Figure 7: Graphic Representation of MSE-22 (operating costs) During the Period March 2006-April 2008. Costs Expressed in Thousands of SEK.

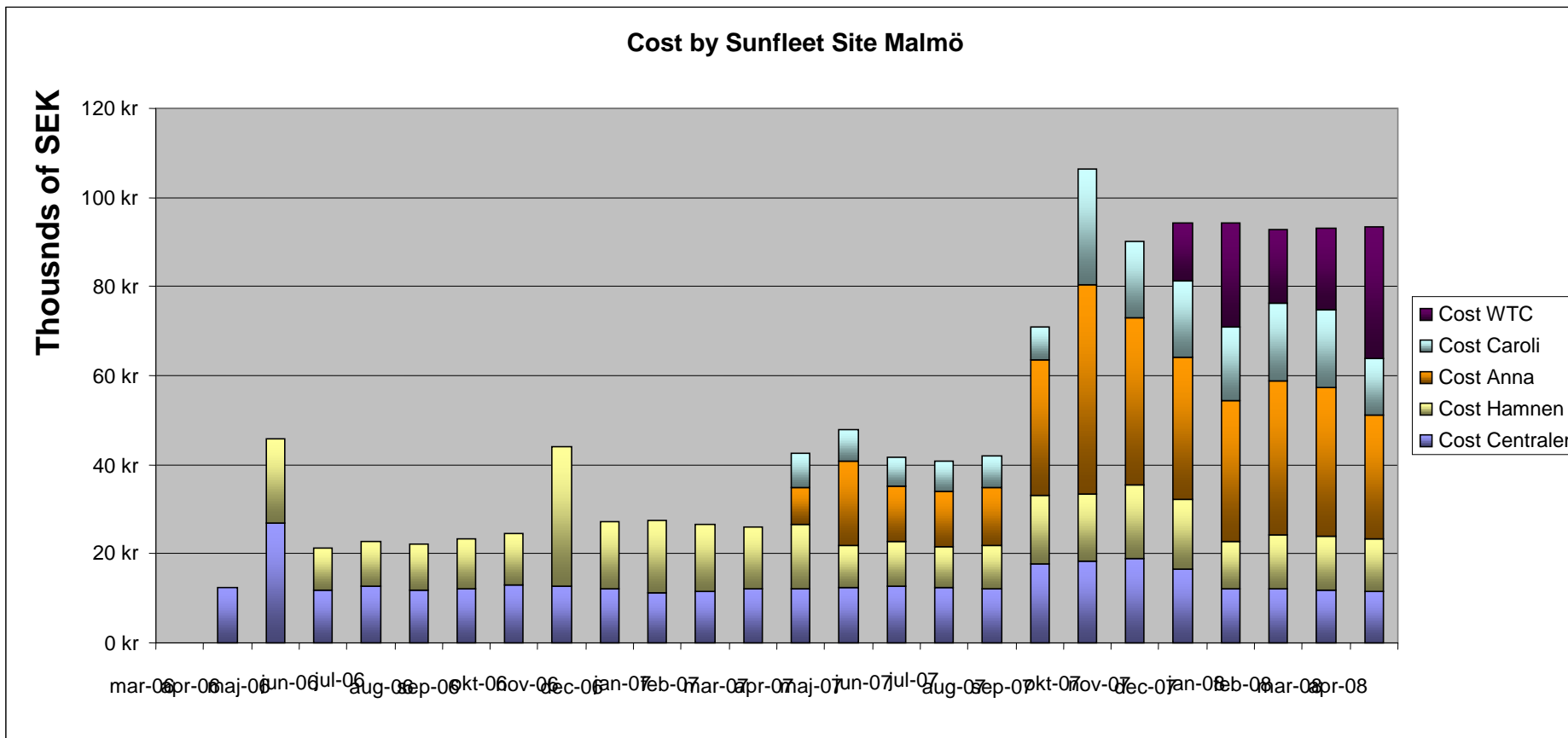


Figure 8: Development of the Economic Results (Revenues-Costs) on a Monthly Basis as Well as Running Trend (March 2006-April 2008)

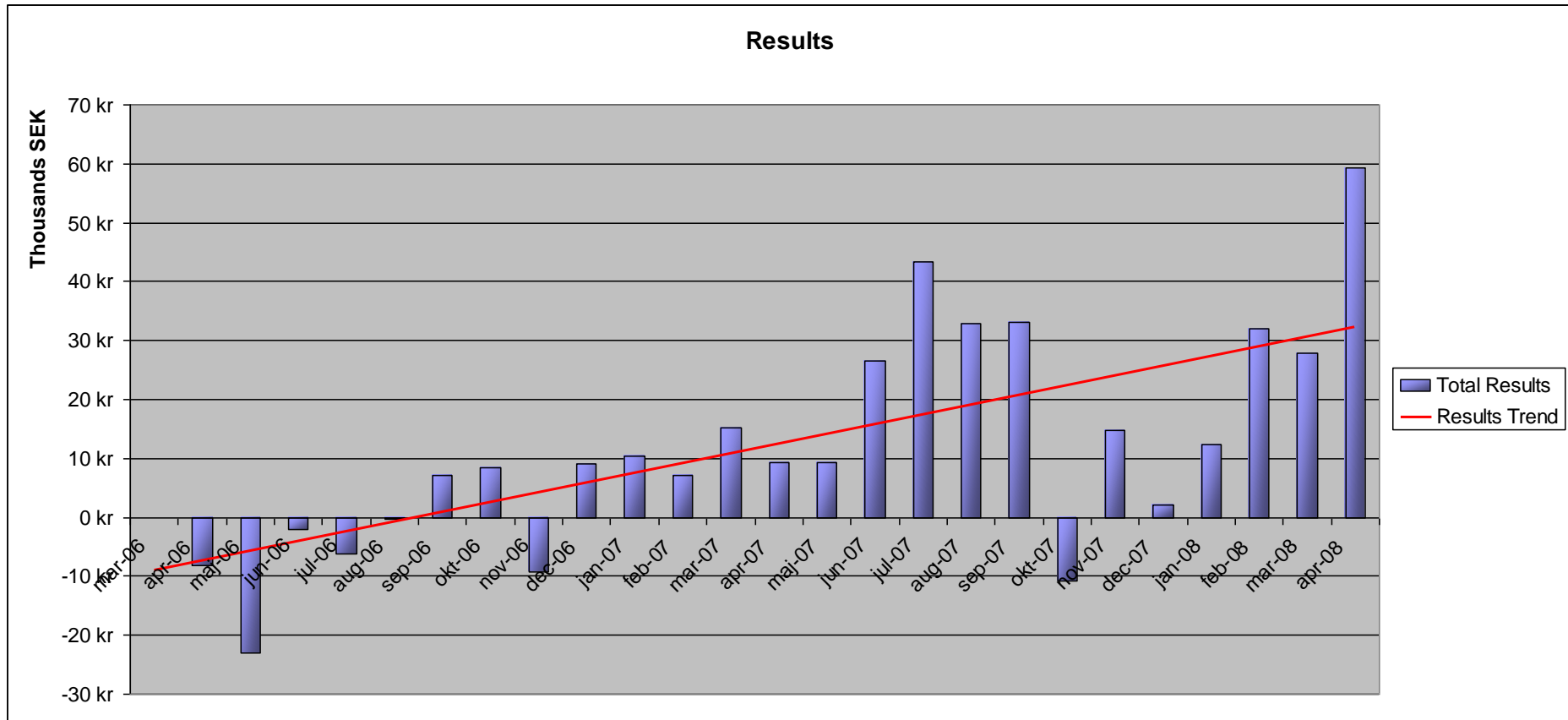
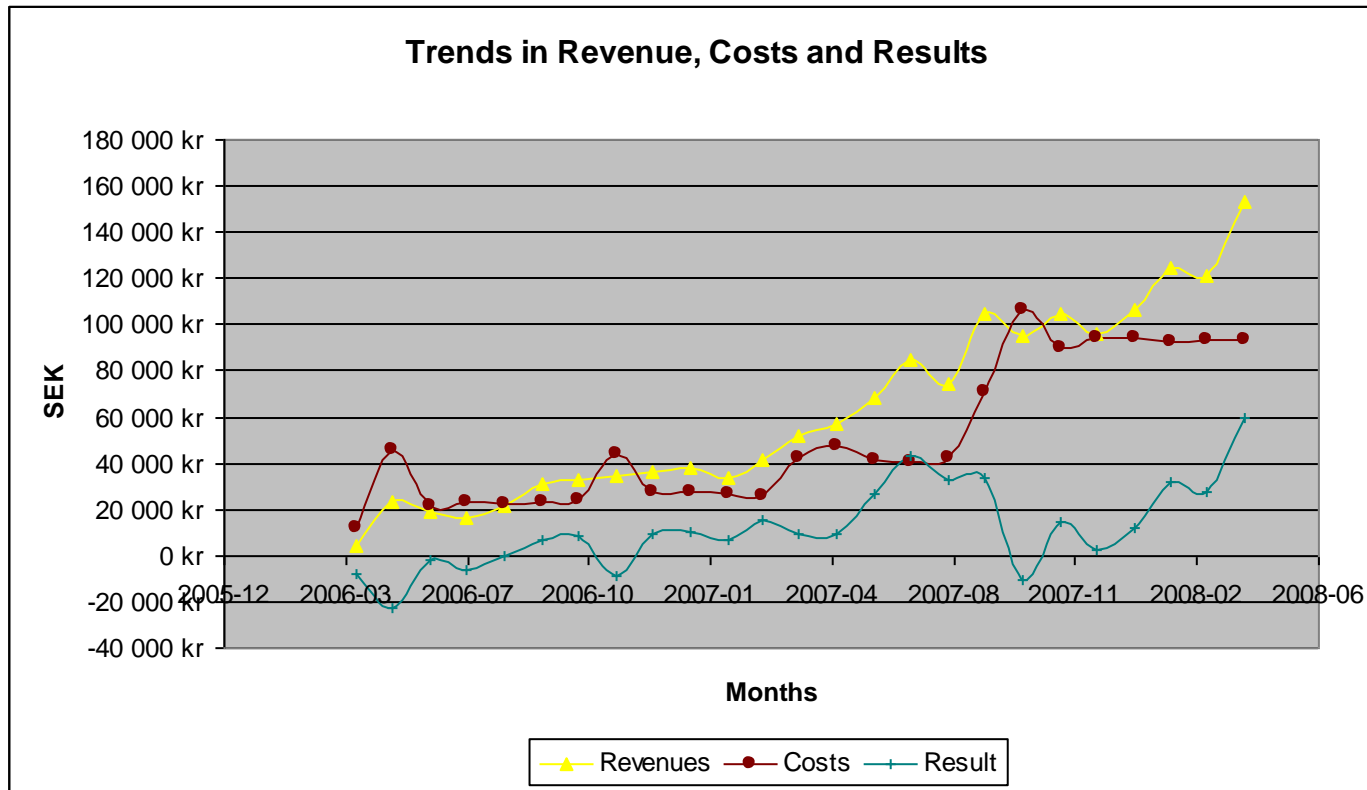


Figure 9: Alternative View of Trends in Revenue, Costs and Economic Results in 9.1 – March 2006-April 2008



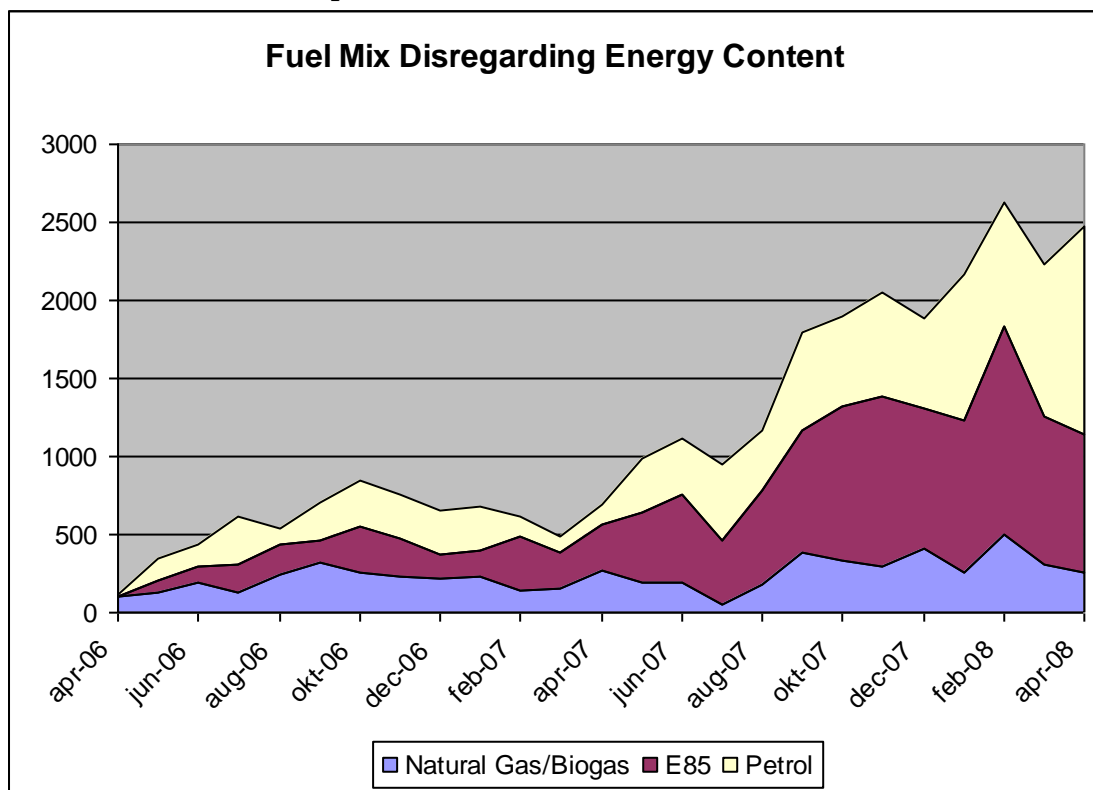
C2.2 Energy

Part of Sunfleet's business idea is to offer vehicles that can run on other fuels and thus avoid petrol. In Malmö Sunfleet has vehicles that can run on natural gas or biogas and those that can use E85 (85% ethanol and 15% petrol). Sunfleet also has vehicles that run on petrol but have very low consumption levels, for example the Toyota Aygo.

In this evaluation we will assume that subscribers to Sunfleet used petrol-fuelled vehicles prior to their association with Sunfleet. From the travel diaries it is apparent that at least one respondent has joined Sunfleet to be able have access to a car and could not afford to own a car otherwise. This means that some households in Sunfleet may have not decreased their use of cars by joining Sunfleet, even if the majority of subscribers doubtlessly will reduce their car usage after joining Sunfleet since all research into car-sharing schemes in general point to reduced car usage on the part of car club members.

Objective 1 is to have car users power the vehicles with fuels other than petrol. The original objective was that 40% of all fuel would be from alternative sources 18 months into the measure and 50% would be alternative 24 months into the measure. Since the measure started to take off during March 2006, 24 months on would be April 2008. Unfortunately it is not clear how this should be measured. If the amounts (m³) of natural/biogas and litres of petrol and E85 are considered "equivalent" the following picture emerges.

Figure 10: Fuel Use on a Monthly Basis with Gas Expressed as Normal Cubic Meters and Petrol and E85 Expressed as Litres



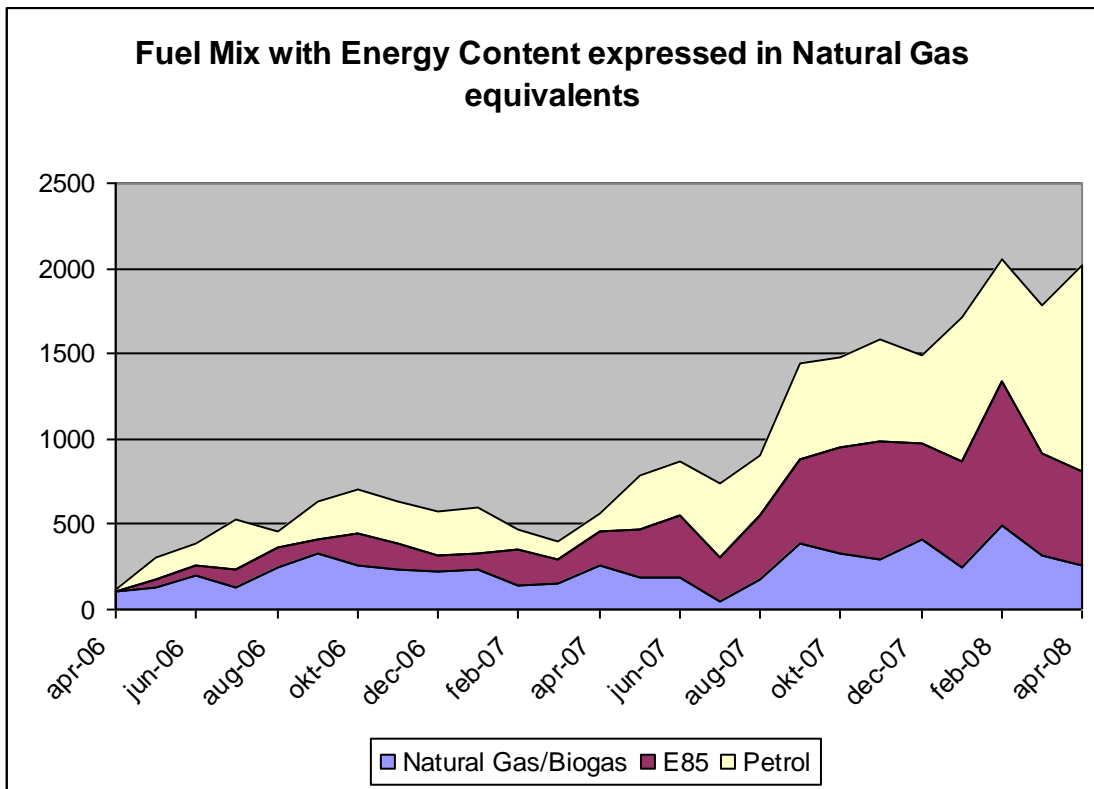
Using this measure it would appear that the measure was successful in reaching the objective but then towards the end of the period was not as successful.

Perhaps the percentages should be determined by using the energy content of the fuels: petrol, E85 and natural/biogas. This means that for objective 1 to be fulfilled at most 50% of the energy used for the vehicles should come from fuels other than petrol.

In this evaluation we will use the following energy conversions to equate the energy content in the three fuels: 1 litre petrol contains 8.8 kwh, 1 litre E85 contains 6.16 kwh, 1m³ natural gas or biogas contains 9.8 kwh. This means that in terms of energy content:
 1m³ gas = 1.11 litre petrol = 1.59 litre E85

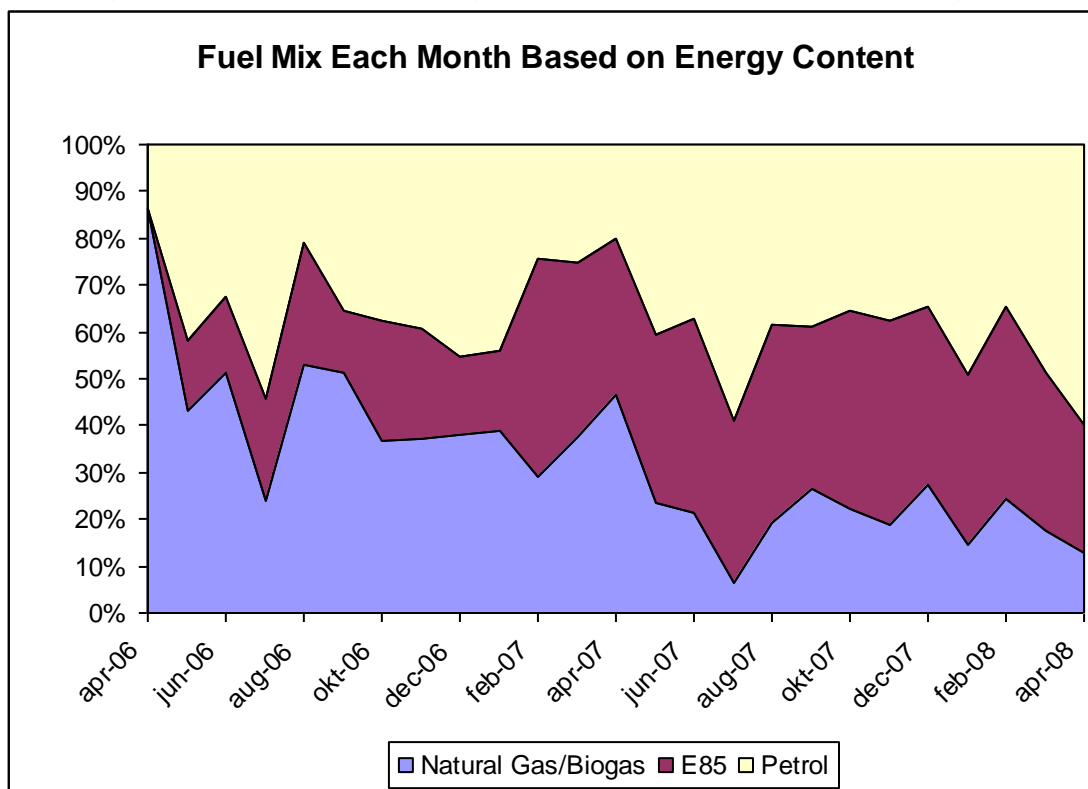
The fuel mix in terms of energy content of the three fuels then becomes for the entire period: 25.6% gas, 40.9% petrol, 33.5% E85. Using this methodology it is clear that the objective was met. However if we look at the monthly fluctuation and long-term picture in the following graph the result suggests that while the objective may be just met, there is towards the end a relative downward trend for both E85 and gas where the use of biogas/natural gas is in absolute numbers rather constant during the entire period.

Figure 11: Fuel Use on a Monthly Basis with Fuel Amounts Expressed in Natural Gas Equivalents of Normal Cubic Meters. See Energy Conversion Factors Above.



The following diagram shows the percentage of fuel usage during the period with fuels weighted towards each other based on their energy content.

Figure 12: Fuel Use on a Monthly Basis Based on Energy Content. Note that the Absolute Fuel Usage would have Increased during SMILE. Here We see the Relative Mix of Fuel Use.



We lack data to be able to determine the efficiency of fuel usage. The objectives for this measure do not include an improvement of efficiency of fuel usage but indicator 3 is included in the evaluation plan nevertheless. Since we do not know exactly which km were driven using a given fuel, the statistics that we could calculate demonstrate more the aggregate usage of the fuels each month and not the efficiency of their use. Therefore since the indicator does not actually measure objective fulfilment the indicator will not be pursued further.

It appears that it will be difficult for Sunfleet to maintain high levels of use of E85 and natural gas/biogas without some supporting mechanism. Perhaps, however, the low level of use of gas reflects the small number of gas filling stations in Malmö. Eon, as part of measure 5.2, is improving the infrastructure for fuelling vehicles using vehicle gas (a 50-50 mix of natural gas and biogas) which means that the number of filling stations will grow. Sunfleet may have to weigh in the location of filling stations for alternatives to petrol, and in particular vehicle gas, when it considers expansion beyond its present five sites.

With regard to the situation prior to SMILE we will round up the total number of km driven in April 2008 to the nearest thousand kilometres. In April 2008 the cars moved approximately 30 000 km using 25.6% vehicle gas (a 50-50 mixture of natural gas and biogas), 33.5% E85 and 40.9% petrol based on the energy content of the fuels. During April 2005 the equivalent, assuming that the distance driven would be in the aggregate approximately the same, would be 100% petrol consumption.

C2.3 Environment

The emissions for this measure follow directly from the previous description of the energy use baseline arbitrarily placed in April 2005 and April 2008. However, as can be seen in section C2.4 Transport, there is some uncertainty about to what extent all of the kilometres driven by Sunfleet cars has replaced previous trips in petrol-fuelled cars. In terms of corporate

kilometres, it seems that use of Sunfleet cars has replaced use of employee cars and thus total car use has been reduced. In terms of household kilometres, the picture is much less clear.

For this part of the evaluation we will assume the following:

- A. All kilometres driven by Sunfleet cars would otherwise be driven by other old, petrol-fuelled cars.
- B. That the mix of fuel usage by the vehicles has been, in terms of energy content 25.6% gas, 40.9% petrol, 33.5% E85. Furthermore, we will assume that by "gas" is meant a "fuel gas" which is a 50-50 mixture of natural gas and locally produced biogas.
- C. The distance travelled in April 2008 using Sunfleet vehicles, 30 000 km, would be the same distance travelled by other vehicles during April 2005.

Baseline

Emissions of CO₂ during April 2005 (after start of SMILE but prior to first Sunfleet subscribers) would therefore be 6000 kg CO₂ based on the calculation 30 000 km * 0.087 litre petrol/km * 2.3 kg CO₂ /litre petrol. NO_x emissions would be 2.1 kg (at 0.07 g NO_x/km) and PM₁₀ emissions would be 0.12 kg (at 0.004g PM₁₀/km). *This assumes that the average age of the vehicles is five years which is a younger car fleet than probably was in use then by the people using Sunfleet cars today. This is a baseline for one month.*

Business as usual

The emissions would have been the same, given assumptions A and C. This is a business as usual scenario for one month.

Effects of the measure

For emissions of CO₂ during April 2008 we retain the same distance travelled with the same level of emissions for the portion of kilometres driven by petrol. For vehicle gas the portion of CO₂ emitted would be halved since the CO₂ emitted from biogas is non-fossil.

For E85 the emissions of CO₂ are controversial since fossil fuels are involved in the production of the biomass which is then used to make ethanol. Different studies reach different conclusions based on their methodology, life-cycle perspective and system cut-off points. Here we have used an 80% reduction of CO₂ emissions based on the assumption that plants used for making more ethanol will absorb the emitted CO₂. This data is taken from the report "Index över nya bilars klimatpåverkan 2007" issued in April 2008 by the Swedish EPA on behalf of the National Road Administration, The Consumer Protection Board and the Swedish EPA and is currently the most appropriate choice of source data for the Swedish situation.

Emissions of CO₂ during April 2008 would therefore be: 3470 kg CO₂

From vehicle gas: 7680 * 0.08 kg CO₂ /km = 614 kg CO₂

From petrol: 12270 km * 0.2 kg CO₂ /km = 2454 kg CO₂

From E85: 10050 km * 0.04 kg CO₂ /km = 402 kg CO₂

Emissions of NO_x would be: 845 g NO_x

From vehicle gas: 7680 km * 0.02 g NO_x/km = 154 g NO_x

From petrol: 12270 km * 0.04 g NO_x/km = 491 g NO_x

From E85: 10050 km * 0.02 g NO_x/km = 201 g NO_x

Emissions of PM₁₀ would be: 105 g PM₁₀

From vehicle gas: 7680 km * 0.002 g PM₁₀/km = 15.4 g PM₁₀

From petrol: 12270 km * 0.004 g PM₁₀/km = 49.1 g PM₁₀

From E85: 10050 km * 0.004 g PM₁₀/km = 40.2 g PM₁₀

This means that during one month the effect of the measure (measure minus baseline) would be the following reductions:

CO₂: 6000kg-3470kg = 2530kg CO₂ i.e. a 42% decrease

NO_x: 2100g-845g = 1255 g NO_x i.e. a 60% decrease

PM₁₀: 120g-105g = 15 g PM₁₀ i.e. a 12.5% decrease

C2.4 Transport

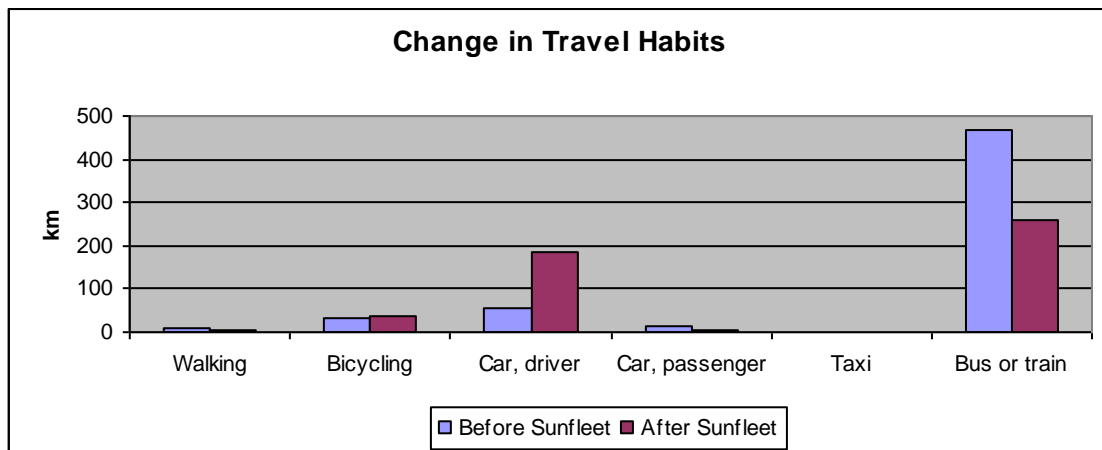
Generally the idea behind a car-sharing club is that members have access to cars without bearing the entire cost burden. This means that habitual motorists who give up their own car will instead use the vehicles available in the car-sharing club and this change leads to a drastic decline in travelling by car. For commercial car-sharing organisations a profit is also to be made.

However, not all members of car-sharing clubs are frequent motorists prior to joining the club. Some have no car prior to joining the club and instead take taxis and use rental cars when they need access to a car. For other trips walking, cycling and use of public transportation would dominate. This means that for some members of a car-sharing club, actual usage of cars for travel might increase in comparison to the situation prior to joining.

The general picture of what has happened with travel habits in Malmö with the advent of Sunfleet appears NOT to be similar to the standard accounts of car-sharing in the literature. This may be because the majority of Sunfleet members who completed the surveys were not habitual motorists prior to joining SMILE. Furthermore, only about 1/10 of all those households who were members in April 2008 completed the survey. This means that the sample size is small. In addition to having greater numbers of respondents this study should be repeated during 2009 to gauge longer term effects.

The travel diaries and surveys collected initially suggest the following average number of kilometres travelled per household:

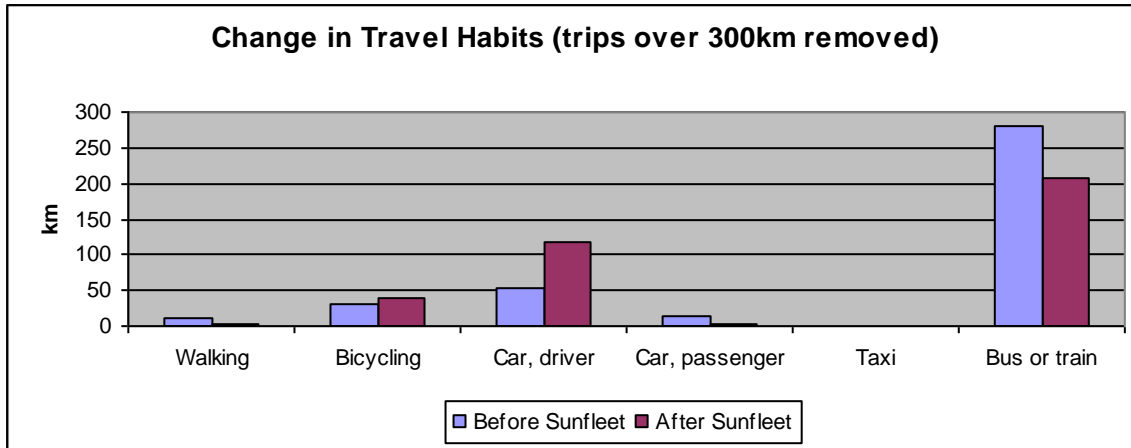
Figure 13: Before and After Joining Sunfleet: Total Km Travelled in an Average Household



A problem in the survey has been that respondents have included trips taken to destinations at great distances from Malmö in their responses. While the study has been designed so that respondents complete two surveys exactly one year apart, which means that the results of before and after should be comparable, long distance trips taken by households tend to dominate the results. This means that a single trip, for example a round trip train journey to/from Stockholm, has a very strong “weight” in the picture.

In an attempt to erase the effects on long distance journeys, all trips over 300 km – regardless of transport mode – were removed from the statistics. The removal of trips over 300 km in round-trip length was based on the assumption that most people living in Malmö would find a regular commute to/from work of more than 300 km on a daily basis to be too taxing. This would mean that trips over 300 km are defined as irregular and removed. The following picture emerges:

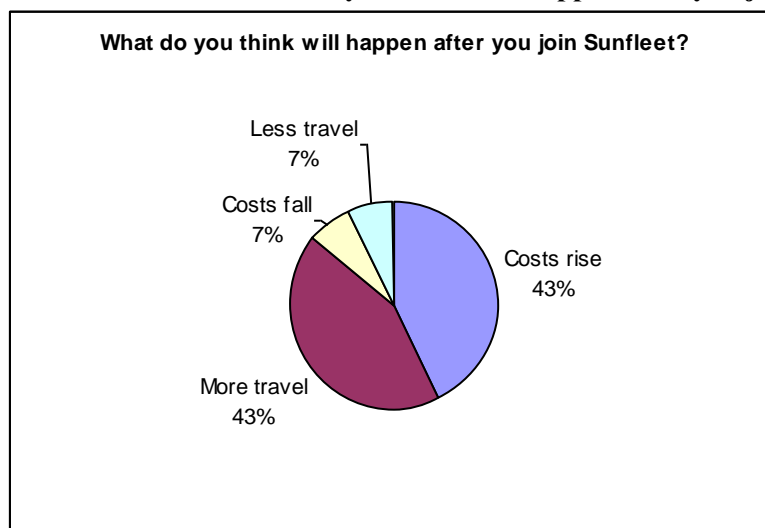
Figure 14: Before and After Joining Sunfleet: Total Km Travelled in an Average Household with Journeys over 300 km removed.



Despite this correction of removing irregular long distance trips the picture of membership in Sunfleet leading to more trips by car remains but is, however, less pronounced. Note that bicycling appears to increase in both diagrams and especially in the second diagram. This is probably in part because of greater use of bicycles to get to and from the car-sharing sites.

More information about polling of new members in Sunfleet prior to starting to use the service is provided below:

Figure 15: Responses to Question “What do you think will happen after you join Sunfleet?”



This picture seems to confirm the previous discussion. Here we see that the overwhelming majority of respondents believe that membership in Sunfleet will lead to greater costs for their transportation and to more total travel. This would be responses one could expect from members in car-sharing organizations that seldom used a car prior to joining.

We can conclude from this study that:

1. the sample size was too small (about 1/10 of household members in April 2008)
2. the sample was dominated by infrequent motorists whose use of cars increased, from a very low level, thanks to Sunfleet
3. longer-term effects could be established if this study was repeated in 2009
4. the results cannot be used to determine a true modal shift

Sunfleet interviews of companies.

Both Sunfleet and the evaluators at LTH/MAH had difficulties getting participating companies to agree to be interviewed about their use of the Sunfleet cars and their travel habits prior to participating in SMILE. Earlier on, the previous CEO at Sunfleet was concerned that universities asking questions would scare off companies from joining Sunfleet or continuing to use Sunfleet's services.

Instead Sunfleet conducted a few customer relations discussions where they attempted to include evaluation questions so that company representatives were evaluated *de facto*. Unfortunately in some cases the summaries provided by Sunfleet did not help understanding about driving and travel habits prior to joining Sunfleet. However companies generally suggested 1) that driving to/from work by employees probably decreased somewhat since fewer employee cars were being used now that Sunfleet cars were used instead, 2) the way employees travelled in and around Malmö for their work was probably unchanged i.e. the percentage of use of bicycles, buses and cars as well as walking was probably unchanged, 3) depending on the company a varying degree of trips by car now took place exclusively with Sunfleet's cars.

Additional comments that might be of interest for the technical evaluation include the following:

- The system is easier to use than we expected.
- Our subscription contributes to environmental protection and supports a green image for us.
- We suspect that our employees have a healthier lifestyle since they don't commute by car to work as much.
- Our company has several locations in Malmö, not all are close to a particular site. This explains why we aren't as active in Sunfleet as we would like to be.
- If Sunfleet would establish a site closer to us then awareness by employees would be greater and usage would be higher.
- We are enthusiastic and satisfied.
- It takes time for the concept to be established in employees' awareness. Our use is growing slowly but steadily.
- This service fits in well with our environmental policy and ambitions.
- We cannot use Sunfleet's cars as much as we would like since some of our staff have to be away with the same car several days in a row.

Representatives of Sunfleet did not have a sense that through usage of Sunfleet's services the total amount of car use by companies has declined. It is difficult to quantify the change in reduced commuter car usage since companies generally have not kept track of individual employee usage of Sunfleet's vehicles.

Additional observations:

Thus far for Sunfleet WTC has proved to be the best site. With no parking fees and a highly motivated company, cars are used frequently. Sunfleet believes that winter months are not as good as the summer months but has no certain explanation for this difference. For Sunfleet the Caroli location is in most need of more business. This may be the result of the choice of location, in a parking garage that has had its share of incidents and people frequenting the

facility for reasons other than cars. The Caroli location might be deterring customers. That parking garages *per se* would mean a less favourable site is not true since the other parking garage, Anna, has better trends of car usage.

During discussions with the previous measure leader it was apparent that Sunfleet was considering whether the site in the Caroli parking garage should be moved to another, adjacent location which customers might find more appealing.

Concluding remarks concerning “transport”

The survey methodology was unable to detect a modal shift of the kind that was to be expected from this measure. This does not mean that there was no modal shift in the direction expected. Instead, for reasons discussed above, the modal shift could not be detected given the sample size (constrained in part because of the need to complete the evaluation prior to the end of SMILE which means the population of respondents is small), the limitations of the methodology, and the poor return rate on the part of the entire population of Sunfleet users.

During the spring of 2008 it was clear to both Sunfleet’s representatives and the technical evaluator that the response rate was too small. Sunfleet attempted to get more responses via Internet contact with members in Malmö and via sending out additional survey forms electronically. Unfortunately these attempts were done centrally and because of mistakes made centrally and technical glitches the majority of Sunfleet subscribers in Malmö did not receive these messages or could not complete the on-line survey. This means that attempts to increase the sample size proved ineffectual.

The technical evaluation could not determine a clear modal shift among households or corporate/organizational customers.

C2.5 Society

According to Sunfleet representatives, awareness of the concept of car-sharing was rather low among the general public and companies when Sunfleet commenced operations in Malmö during 2005 and 2006. Besides staff turn-over, the low level of awareness was the principle reason for a slow start since the base of actual awareness about car-sharing in Malmö was quite small at the start. This would appear to contradict the responses provided in the 2003 Travel Habits Survey conducted by the Department of Streets and Parks where the following questions were posed with percentages in brackets after the answers.

Have you heard about car-sharing?

- Yes, and I feel rather knowledgeable about it. [28%]
- Yes, but I don’t feel very knowledgeable about it. [39%]
- No. [33%]

Are you a member of a car-sharing scheme/car club?

- Yes. [1%]
- No.

→ If you answered no, how great is the likelihood that you would join a car-sharing club during the next 12 months if you received an offer to join.

- very great [3%] rather great [12%]
- rather little [41%] not at all [44%]

While users of Sunfleet’s services are both aware and accept the concept of car-sharing, objectives 3 and 6 are also oriented towards the general public which is the population that Sunfleet will draw on for its activities and services to grow in Malmö. This means that for future expansion the level of awareness about car-sharing on the part of the general public

must grow and the degree of acceptance of the idea among those aware of the concept must grow in parallel.

To some extent, growth of awareness and acceptance can be attributed to the existence of the car-sharing sites and the services provided by Sunfleet with no active marketing involved. Users of the vehicles mention their (positive) experiences to others. Other sources of increased awareness and acceptance can come from active marketing on the part Sunfleet and indirect marketing where activities conducted within measure 11.1 may mention car-sharing as an option. Finally, media attention to environmental issues has grown during SMILE and, in particular reporting about climate change, has left an impression on parts of the general public in Sweden and Malmö during 2006 to today. This may have had an influence on *acceptance* levels of car-sharing.

Therefore: the measure itself may have increased awareness and acceptance but improvements in the degree of awareness and acceptance have not been based solely on the measure itself.

During April and May 2008 over 3000 surveys concerning travel habits and SMILE measures were distributed and collected in central locations in Malmö. Between 1811 and 1915 responses were received. To facilitate comparisons the questions and possible answers were similar to the questions posed during 2003.

Figure 16: Result of Asking the Question “Do you know what car-sharing is?”

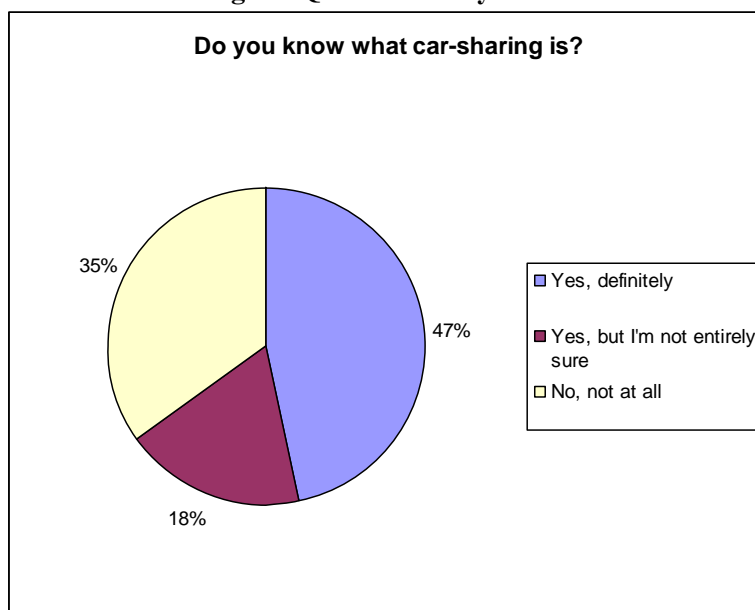


Figure 17: Result of Asking the Question “Do you know someone who is a member of a car-sharing organisation?”

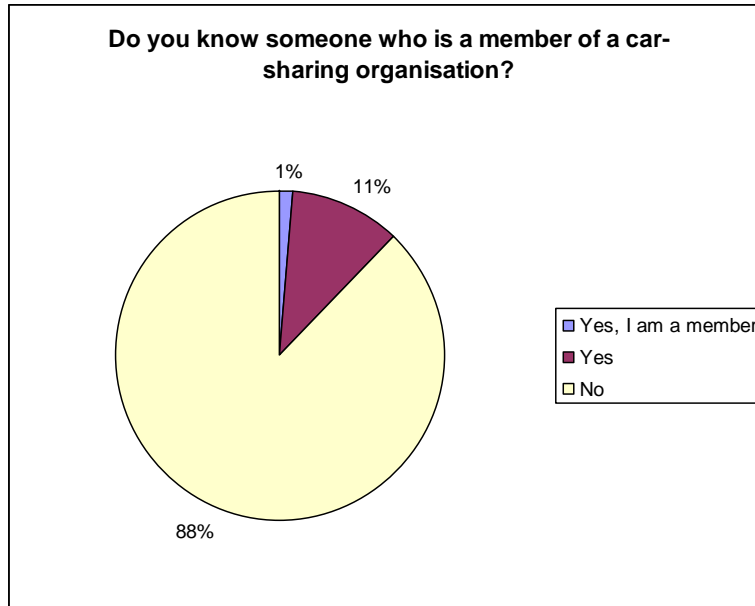


Figure 18: Result of Asking the Question
“Would you join a car-sharing scheme if you got an offer to join during the next 12 months?”

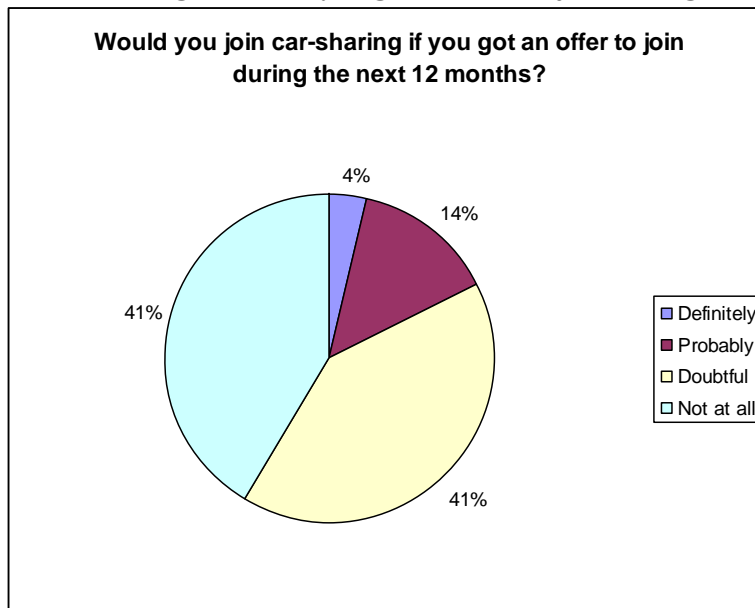
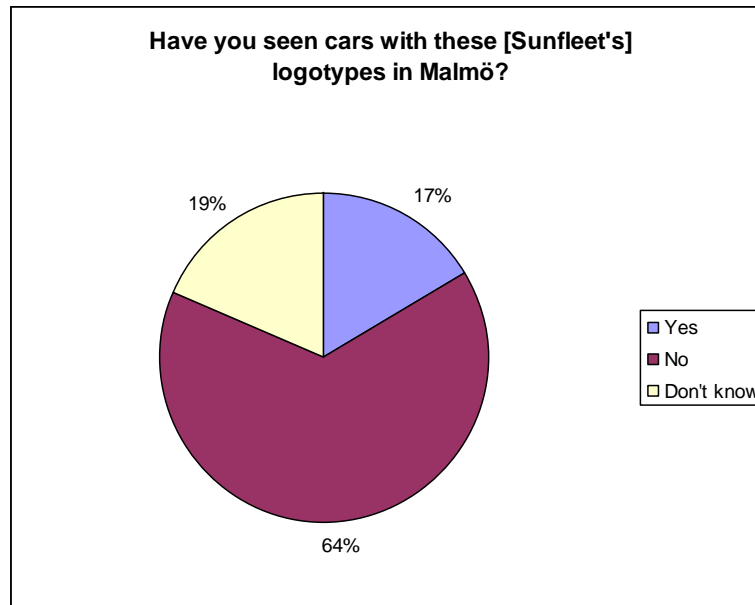


Figure 19: Results from Asking the Question
“Have you seen cars with Sunfleet logotypes in Malmö?”



While the delivery mechanism, rate of response and the exact formulation of the questions in 2003 and 2008 differed, it is still possible to make an approximate comparison:

Awareness of the concept:

Those who did not know about car-sharing at all increased slightly from 33% in 2003 to 35% in 2008.

Those who said they knew about car-sharing and were quite sure about their knowledge grew from 28% in 2003 to almost 47% in 2008. While those who said they knew about car-sharing fell slightly, the degree of knowledge about car-sharing among respondents who knew about car-sharing increased.

Membership and familiarity:

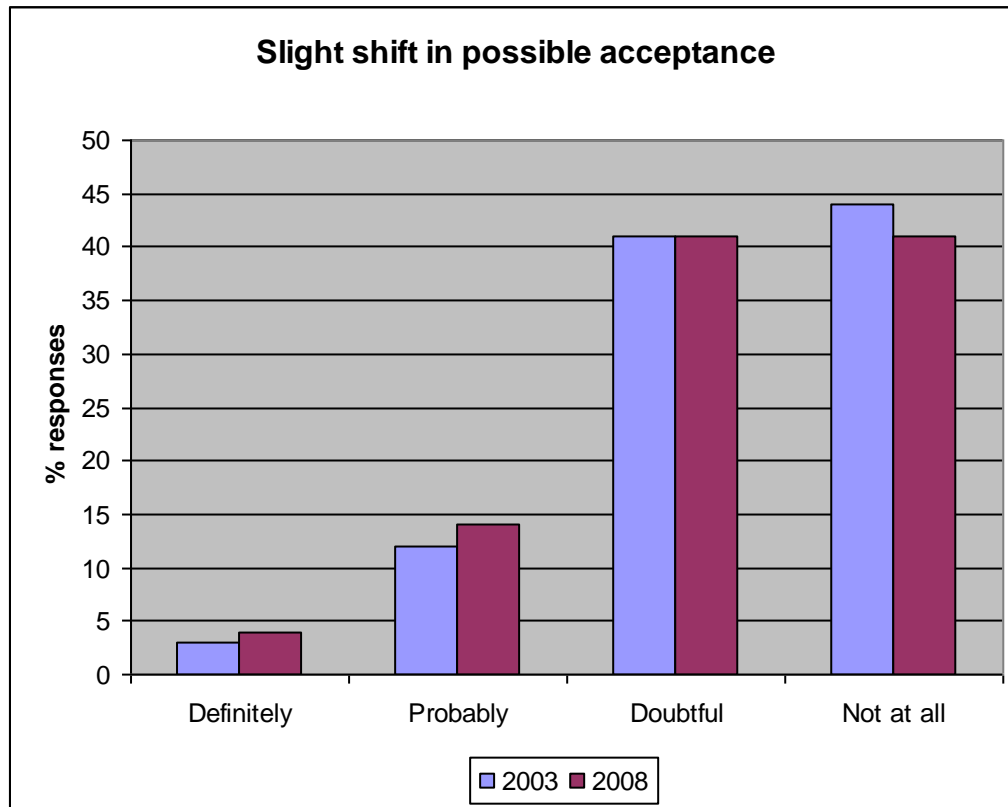
In the survey from the autumn of 2003 about 1% of respondents said that they were part of a car-sharing scheme. The survey from the spring of 2008 points to just under 1.5% of respondents being part of a car-sharing scheme (rounded down in label of the graph so it is not apparent). The 2003 survey commented that this 1% surely reflected informal arrangements for sharing of cars. There is no reason to doubt that the increase to 1.5% in 2008 reflects increased interest in the sharing of cars but still over represents the existence of car-sharing arrangements. While the 2003 survey did not ask if the respondent knew of others who were members in formal car-sharing arrangements, the 2008 survey points to approximately 11% of the population knows of other people who share cars. Probably those people in Malmö who know of others who participate in the sharing of cars – formally or informally – would increase the likelihood for awareness and acceptance of car-sharing.

Acceptance of the offer or service:

As can be seen in the diagram below, there has been a slight shift in acceptance. However those that remain doubtful and reject car-sharing are a very large majority.

Figure 20: The Measurement of Acceptance of the Measure

“Would you join a car-sharing scheme if you got an offer to join during the next 12 months?”



In the 2003 Survey conducted by the City of Malmö the compiler of the results suggested that there was a large latent interest in joining car-sharing schemes and the results suggested that a sizeable population of city residents would be interesting in joining. The results of the evaluation of this measure during 2008 show that there were either flaws in the 2003 survey or that there were overly optimistic interpretations of the results from the survey at that time.

Finally, while the previous discussion of awareness and acceptance deals with the entire population of Malmö, it can be of interest and value to see some measure of awareness and acceptance on the part of the subscribers to Sunfleet in Malmö. Upon subscribing, members were asked several questions:

One of the questions concerned how much the subscriber knew about car-sharing prior to *hearing* about Sunfleet in Malmö. About 20% of respondents said that they knew quite a lot about car-sharing prior to hearing about Sunfleet. About 80% claimed that they had heard about car-sharing prior to hearing about Sunfleet but didn't know so much about the concept. None of the respondents said that they knew nothing about car-sharing prior to first hearing about Sunfleet. *This suggests that Sunfleet alone cannot raise awareness about car-sharing as a concept in Malmö and that acceptance of Sunfleet's offer requires prior awareness.*

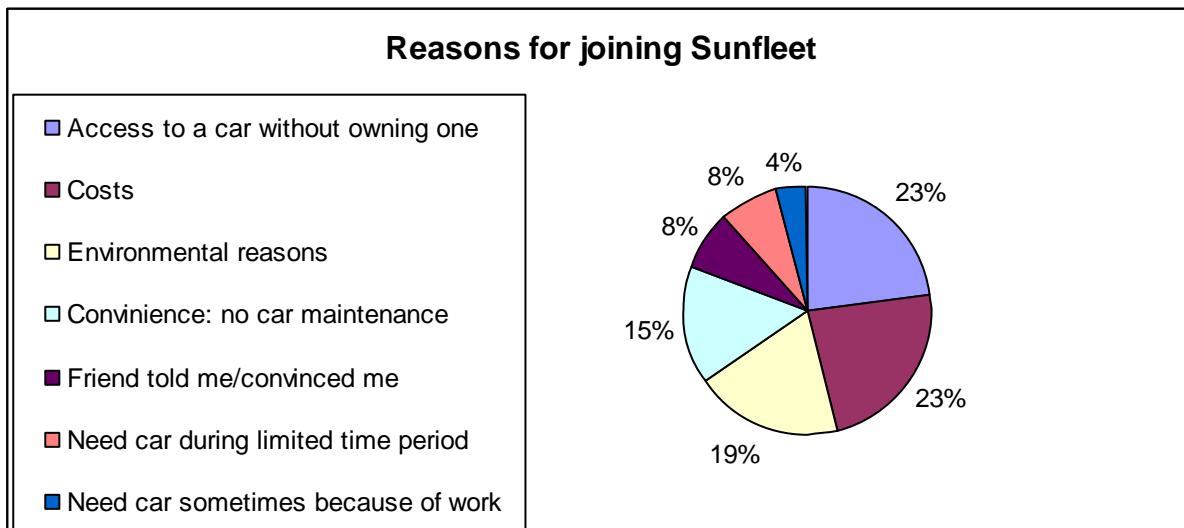
Another interesting observation is the time lapse between first hearing about Sunfleet's service and actually joining Sunfleet as a subscriber. Among households that responded about 45% claimed that it was about one month or less between first hearing about Sunfleet and when they started their subscription. Another 45% claimed time periods of two to four months between first hearing and the start of subscription. The remaining 10% took about six months from first hearing about Sunfleet in Malmö and actually subscribing.

While this suggests that Sunfleet's marketing, among those people in Malmö who are already aware of the car-sharing concept, seems successful and leads to a rather quick take-up, we may not be seeing the entire situation. The nearest location of a site to access cars is also a

factor. Those who wait to become members may do so until there is a site close enough to home.

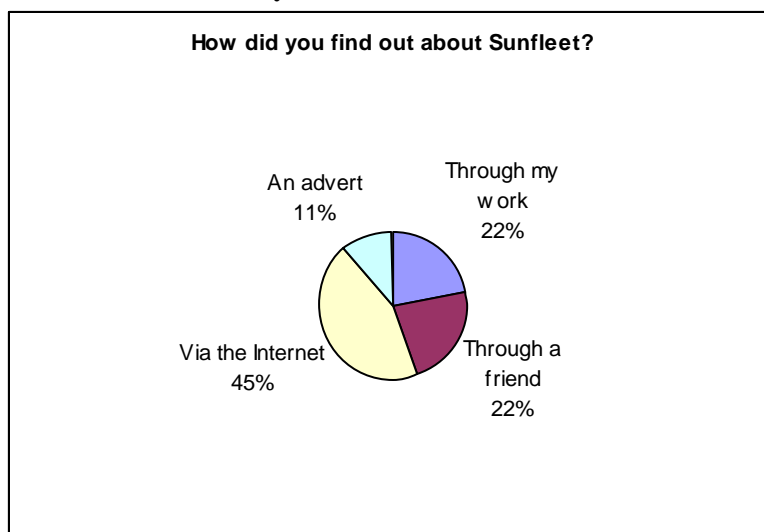
The reasons for joining Sunfleet are shown below.

Figure 21: Why Did You Join Sunfleet?



In response to the question how respondents found out about Sunfleet we see that almost half found out about Sunfleet via the Internet. While it is possible to stumble across something by accident on the Internet, many people use the Internet to actively try to find something. This means that almost half of the respondents already knew about car-sharing and actively tried to find either a service in Malmö or tried to find out more about it. The other respondents received information about Sunfleet more passively: the information was presented to them via their workplace, through a friend or was seen in an advertisement of some sort. These responses reinforce the picture of a small segment of the entire population in Malmö being aware of the car-sharing concept, identifying themselves with their needs and attempting to actively find a car-sharing organization that meets their needs. And, further, this suggests that once awareness about car-sharing reaches a certain level among some members of the public that they then take the necessary steps to move themselves towards acceptance – in this case a subscription to Sunfleet.

**Figure 22: Question Asked of Members in the Car-Sharing Scheme
“How did you find out about Sunfleet?”**



C3 Achievement of quantifiable targets

Table 6: Overview of Measure Success

No.	Target	Rating
1	Change fuel mix used from petrol to more environmentally clean fuel	**
2	Change of transport behaviour, i.e. use of car-sharing cars	*
3	Awareness and acceptance of the ecological car-sharing concept	*
4	Change of transport behaviour among private persons	0
5	To form five car sharing sites in Malmö city with a total of 15 cars	**
NA = Not Assessed 0 = Not achieved * = Substantially achieved (> 50%) ** = Achieved in full *** = Exceeded		

C4 Up-scaling of results

Based on current trends in the growth of kilometres driven using Sunfleet vehicles continuing (average growth in km driven has grown by ~36% on a quarterly basis from July 06-July 07 and by 27% on a quarterly basis from July 07 to April 08) we will conservatively assume that during the entire year of 2009 a total of 770 000 kilometres will be driven using Sunfleet vehicles. This conservative assumption is based on an 18% quarterly growth rate between April 08 and the end of 2009. It does not take into consideration the two car-sharing sites established during 2008 after the cut off for SMILE evaluation (which are over and above the five required in the SMILE contract) and does not include additional car-sharing sites that Sunfleet may be able to establish in the coming months and during 2009. This means that it would be very unlikely for Sunfleet to not achieve the following emissions reductions during 2009 in comparison with 2005.

64949 kg CO₂
 32 kg NO_x
 385 g PM₁₀

Looking further ahead into the future, there are four possible strategic tools that could be used in the expansion of the measure in Malmö.

1. Establish more car-sharing sites in less central locations in Malmö. This would meet needs of households and businesses with less central locations.

2. Attract more members through existing channels and add additional cars at existing sites.
3. Use new methods of marketing, perhaps in conjunction with projects that follow on from existing SMILE measures, to reach additional potential users of Sunfleet's vehicles. Examples include: eco-driving measures, mobility management measures, measures where Skånetrafiken was the principle measure owner, etc.
4. Increase fuel mix in direction of lesser use of petrol through: A. Campaigns directed to existing users of Sunfleet's service to get them to use E85 and biogas more. B. In introductory materials, emphasize that the cars should run on E85 and biogas. Petrol should only be used if absolutely necessary. C. Let the various sites and/or cars "compete" with each other for an award for most "clean" fuel used.

Perhaps Sunfleet will pursue several of these strategic tools in parallel and, when necessary, partner with various SMILE partners in the future resulting in a larger number of sites, with more cars at each one, a larger pool of users, who are more inclined and better able to use the clean fuel options and a greater range of influence in the region.

There are many factors at work here. There is however scope to continue to expand the service as it is starting from a very low share of the market, although by 2015 ways to engage with those who are less inclined to participate in this type of scheme will need to have been found.

C5 Appraisal of evaluation approach

The evaluation approach follows GUARD methodological guidelines but some problems arose:

- **Problem 1 – Surveys** – When setting out to change transport behaviours, it is necessary to carry out a detailed analysis of people's existing behaviour, establishing people's existing transport needs and most of all endeavour to find out what the incentives are for people to change their travel behaviour. This is required so that the objective which aims to achieve this can be properly defined and measurable. The surveys and travel habits questionnaires sent out by Sunfleet on behalf of the evaluation staff did not give the response we had hoped for. In practice it was also difficult to get returns of the follow up survey to determine trends in travel habits. Sunfleet attempted to conduct qualitative telephone interviews with business customers and during the spring of 2007 attempts were made by Sunfleet to get customers to answer questionnaires sent via Internet. This concerns primarily the following indicators: MSE-20 Attitude Change, MSE 23- Shift in travel habits- previously owned a car, MSE-24 Shift in travel habits- didn't own car before.
- **Problem 2 – Setting objectives** – To gauge the success of a measure its objectives need to be tangible, achievable and measurable and not simply set as statements. It is recommended that the objectives are properly researched prior the start of the project to meet the project requirements and enable the evaluation process to correctly measure their achievements and overall success of the project. It should be possible to determine the increase in use of biofuels and the car occupancy by putting in place quantifiable measures and objectives.
- **Problem 3 – Delays in measure** – Since the measure did not establish car sites as quickly as anticipated (but compensated for this in part by rapid expansion later) there has been insufficient time to follow car-sharing users at all sites for at least one year following the establishment of a site.

This measure, as well as several other measures afflicted with delays, has had a rollercoaster kind of development where at times speed is great and at other times not much happens. It is difficult for evaluation staff to quickly adapt to these changes and meet changing circumstances in a very timely manner.

C6 Summary of evaluation results

The key results are as follows:

- **Delivery of a profitable car sharing system** – The measure has succeeded in delivering the proposed five site / 15 car system in a profitable manner that has generated interest and enough opportunity for continued expansion; (already to 7 sites and plans for more).
- **Using the car sharing system to increase the uptake of clean vehicles** – Sunfleet was specifically designed with the intention of providing cars that offer the option of using clean fuels (E85 and fuel gas) and incorporating promotion of these fuels as part of the implementation process. The data shows that in comparison with a likely near 100% petrol baseline, the energy mix of the Sunfleet cars has been 25.6% gas, 40.9% petrol, 33.5% E85. However, it is also clear that promotion and availability of these fuels are key to success.
- **Resulting reduction in vehicle emissions** – By virtue of the shift from petrol to other fuels there appears to be a reduction in emissions from the use of cars in Malmö by:
 - 2530kg CO₂ i.e. a 42% decrease for the distance covered by participating vehicles
 - 1255 g NO_x i.e. a 60% decrease for the distance covered by participating vehicles
 - 15 g PM₁₀ i.e. a 12.5% decrease for the distance covered by participating vehicles
- **No evidence of a net change in travel behaviour** – Unlike other car share / car club systems there is no evidence that there has been a change in personal travel behaviour away from the use of the private car amongst those who have participated. The evidence is limited due to the small sample of surveys returned, but it appears that Sunfleet may have been more popular among those who did not previously own a car (so offering them greater mobility) rather than among those who previously owned a car and who considered the opportunity to reduce their mobility costs. It appears that the company travel using the system is a straight substitution of use of Sunfleet as compared to their own vehicles, and so is driven by a mix of commercial and subsidiary environmental motivation.
- **Continuing opportunities for expansion of the car sharing system** – Concrete plans to progress the system further.

D Lessons learned

D1 Barriers and drivers

D1.1 Barriers

- **Barrier 1 – Small company** – Sunfleet, as any small company, is very sensitive to loss of personnel. This affects the whole project with delays and loss of profit. It is extremely important that all staff, from CEO down, are loyal, passionate and persistent in this situation.
- **Barrier 2 – Technology** – The telematics technology in the cars is very advanced and requires a strong supplier that can meet future growth and demands. The original supplier could not meet Sunfleet's needs.
- **Barrier 3 – Awareness and acceptance** – For reasons that are complex and not readily understood by Sunfleet or the evaluation staff, many people and organizations in Malmö have not been as interested in the car sharing concept as people and organisations in larger or similar sized cities in Sweden. The car sharing concept is a new idea that many never heard of. The expectations about the amount of work required to market the measure and the resulting success were based on experiences in the establishment of car-sharing elsewhere. Malmö proved initially to be more difficult. Sunfleet found it very time consuming to assure people that it is all right to change their behaviour when it comes to transportation.

- **Barrier 4 – Open pool sites** – The original plan to offer some pool sites to a closed group of users in the initial “fragile” start of the project proved to be a bad plan. It proved to be a much better economic and practical solution for both Sunfleet and its users to let all kind of users use all sites. Once the plan was changed this barrier fell away.

D1.2 Drivers

- **Driver 1 – Unique concept** – Since commercial car sharing is a new concept on the Swedish market this makes the whole project very interesting. Moreover Sunfleet may be one of Europe’s ONLY “clean vehicle commercial car sharing fleet”. This, combined with Driver 2, added to company interest after an initial slow period.
- **Driver 2 - Hot topic** – Environmental questions and particularly emissions from traffic contributing to climate change are one of the biggest topics at the moment. The transportation and car industry have a lot of work to do to meet new demands when it comes to pollution. Sunfleet, through its owners at Hertz and Volvo Car Corporation, see many future opportunities. Being part of the industry Sunfleet feels its responsibility to join forces and work towards a better environment.
- **Driver 3 - Participation in CIVITAS Smile** – During SMILE Sunfleet has met people in the transportation sector active in and around Malmö. Without SMILE it would probably have taken longer to have a chance to meet these people. Sunfleet says that it has been interesting and helpful working in the Smile framework with others who are working towards similar goals with regard to behaviour and transportation. This is definitely a driver!
- **Driver 4 - Happy customers** – Happy customers is of course a huge driver. Sunfleet says that complaints are rare and every happy customer can be an “ambassador” for the car sharing concept! As of mid-2008 the number of members is climbing steadily about 10-15 users a month.

D2 Participation of stakeholders

- **Stakeholder 1: Malmö högskola** – Throughout the project Malmö Högskola has participated by helping Sunfleet to define indicators for the evaluation stated in the inception report, conducting surveys, making questionnaires etc. There was an unfortunate gap in time when our evaluator was not available due to organizational issues at Malmö Högskola. Due to this we lost momentum regarding how the surveys were done. Other than that, this has proven to be an excellent relationship.
- **Stakeholder 2: HM Skåne** – This is an organization driven by different companies and government organizations within the transportation business. Their line of work is to promote Sustainable transportations. A couple of persons at HM Skåne have followed Sunfleet with great interest during the project in Malmö and have done what they can to help and further promote the car sharing business in the area.
- **Stakeholder 3: Users and customers** – The users and the customers of Sunfleet have taken great part in promoting the car sharing concept in Malmö. They have also been given opportunity to help out with ideas to further develop a successful concept. The users are no doubt our best “ambassadors”.
- **Stakeholder 4: Media** - The local media showed great interest in the concept when it first started spring 2006. Since Sunfleet has had a lot of personnel loss, the work to try to get the attention of media failed for a long time. Since the project now is almost completed and the media is all about environmental friendly cars, there should be no problem to get their attention at this point. Over 200 users and 15 cars in Malmö City is pretty impressive.
- **Stakeholder group 5** – a selection of organisations that provided services necessary for Sunfleet to function in a co-ordinated way.

- Netigate, private company, principal participant, providing work on website and on-line booking system
- Pilotfish, private company, principal participant, providing telematics boxes in cars
- Inverse, private company, principal participant, providing telematics boxes in cars and their support
- Haikers AB, private company, principal participant, providing smaller service of cars and car cleaning
- Digidoc, private company, principal participant, providing 24 hour Service Helpdesk for users' calls concerning any problems and questions they may have
- P-Malmö, public enterprise, principal participant, providing space for all cars by renting out the parking lots in different locations through out the city
- Jiborn Communication, private company, principal participant, a role of a Measure Leader. They make sure that information regarding the project reaches all involved, they gather information and provide administrative reports.
- Three different advertising and marketing bureaus (Jagraf, Volvo in-house, Marknadsmedia), private companies, occasional participants, providing marketing, such as brochures, flyers, ads, raising profile.
- Bilja (Car service shop), private company, occasional participant, providing car service and repairs
- Telia and Telenor, private companies, principal participants, ensuring the provision of telecommunication, i.e. sending signals to cars

D3 Recommendations

- **Recommendation 1: Strong organization** - Make sure you have a strong organisation and sufficient staff resources. This is particularly important if taking the approach of subcontracting much of the technical skills required from a range of organisations.
- **Recommendation 2: Suppliers** – Evaluate your suppliers carefully. Advanced technology and digital solutions are very expensive and need to be able to meet all different increase of demands.
- **Recommendation 3: Location and availability of pool site** – In the beginning of the project, it is extremely important to pick a strategic good spot for the car pool site – close to both companies and private homes – to get as good use rate over 24 hours as possible. There are a lot of costs involved in the beginning of the project and the number of users at that stage will be small. By doing this availability increases for everyone and costs are lowered. When the amount of users grow it is easier to expand.
- **Recommendation 4: Expectations** - Since carsharing is still fairly unknown, it might take much longer than expected to implement, particularly in the initial stages. One of the hardest things is to try to change people's behaviour. Be patient. Younger users have a tendency to grasp and approve of the concept faster.
- **Recommendation 5: CIVITAS project** – If the opportunity is given – do not hesitate to participate in a EU/ CIVITAS project to be able to start a car sharing site. You are part of some very important work to try to change the transportation industry.
- **Recommendation 6: Planning** – When planning a new project it is advisable to seek information of similar projects elsewhere and learn from their 'lessons learned' logs and

reports. This ensures that good practices are used and built upon and any mistakes avoided and thus not repeated.

- **Recommendation 7: Market Research** – It is recommended to establish whether reasons why people joined the car sharing scheme meet the objectives of the scheme. This will help create an understanding of the measure effectiveness and enable future planning of the scheme in ways to ensure its success. It will also help understand the best methods to attract existing car owners in order to capitalise on the opportunity to reduce the total number of car trips made.
- **Recommendation 8 – Integration** - When planning future car sharing sites their integration with public transport needs to be considered to promote modal switch and achieve seamless transfer between transport modes. Correct measures also need to be put in place to determine the success of modal switch and increase in car sharing and public transport usage.

D4 Future activities relating to the measure

A post-SMILE aim is to link the car pools to public transport. By linking to different kinds of transport modes, more citizens might be attracted to the system and use car-sharing in conjunction with public transportation. As a result fewer private cars would be required. During SMILE, Sunfleet and Skånetrafiken have found each other and have started talking about some form of collaboration, perhaps similar to collaboration that Sunfleet has with Västtrafiken in Göteborg. Presently Skånetrafiken is not technically prepared to start such a project.

Sunfleet is looking into the possibility to cooperate with bicycling initiatives, campaigns and projects.

Sunfleet believes that the project is, despite initial delays, now going well. Sunfleet now has a total of seven car-sharing sites in Malmö and they plan to slowly expand to the suburbs in and around Malmö as well as the nearby city of Lund. Sunfleet is active in other Swedish cities where there is probably room for additional expansion.