

A Introduction

This measure concerns the intention to make many municipally-owned or leased light vehicles in the City of Malmö clean by the end of SMILE and the resultant effects of this change. Light vehicles is taken to mean those weighing less than 3.5 tons. The majority of these light vehicles are passenger cars and delivery vans/mini-buses.

In 2004 prior to the start of SMILE approximately 33% of municipally owned or leased vehicles in the City of Malmö could be considered “clean”. Five years before the figure was 25%. Such vehicles typically cost more in initial investment, there was at that time widespread uncertainty on the part of the potential users (both administration and employees) about the availability of alternative fuels in the future, and there was a general lack of knowledge about clean vehicles in large parts of the city administration.

Among parts of the general public there were similar levels of interest in and knowledge about clean vehicles as there were within the City administration. At the start of SMILE one of the overall goals of this measure was to change public perception about clean vehicles by demonstrating that the City of Malmö was making 100% of its car fleet clean and, therefore, that clean cars might be a possibility the next time a citizen is considering a car purchase. For this reason much interest was placed on the potential so-called demonstration effect of this measure rather than the direct results of the measure.

During the actual implementation of this measure, public interest and awareness about the feasibility of cleaner cars grew because of changes external to CIVITAS/SMILE and unrelated to this or other SMILE measures in Malmö. **This awareness - caused primarily by global, national and local media coverage of climate and environmental issues - led to a greater interest on the part of the public for cleaner vehicles.** This interest combined with a 10 000 SEK rebate/cashback on cleaner cars financed by the national Swedish government led to dramatic changes at the national level: during 2007 the percentage of newly purchased and registered cars in Sweden considered “environmental” or clean was 17.8% (Untitled slideshow presentation held at various times in 2008 by Bertil Moldén, CEO of Bil Sweden).

These developments make it difficult to assess the degree to which the so-called demonstration effect of this measure resulted in changes in consumer preference when purchasing a new car in Malmö. The reader should bear this in mind: that **the stated principle objective of the measure has been superseded by factors and developments external to SMILE.**

A1 Objectives

The intention of this measure is to increase the percentage of clean vehicles in the municipal light car fleet from approximately 32-34% prior to SMILE to as close to 100% clean vehicles as possible by the end of 2008. The number of clean vehicles purchased or leased should be increased by at least 250 from 2005 to the end of 2008.

The measure objectives are:

- **Objective 1** - Increase Awareness
- **Objective 2** - Increase Acceptance

- **Objective 3** - Reduce Emissions
- **Objective 4** - Increase the number of natural gas or biofuelled cars used by city employees through changes in the selection of vehicles. At the beginning of SMILE 33% of the cars (vehicles below 3500 kg in weight) in the fleet were defined as clean vehicles
- **Objective 5** – According to the original Detailed Measure Plan (DMP), the intention is that the municipal car fleet will, by the end of SMILE, be considered 100% clean. *The reader should note that this objective will not be physically possible to realize during SMILE since even if **all** new vehicles were clean, many of those purchased before SMILE that were conventional cars will still be in use at the end of SMILE.* According to the DMP (detailed measure plan) from May 2005 “the demonstration effect of the clean cars is the most important aspect of the activity,” with the more direct effect of CO₂, NO_x and VOC reductions being considered a less important result.
- **Objective 6** – Demonstration effect (objectives 1 and 2) leads to private people purchasing their own clean cars after seeing that the municipality has done so.

No numerical goals associated with the demonstration effect were originally set. The following were taken as a starting point for a discussion between the local evaluators and the [then] measure leader in late 2005/early 2006. **This should not be taken as the establishment of formal targets within SMILE but informal considerations that might, if possible, inform the construction of the technical evaluation process and methodology for measure 5.1.**

- At least 20% of the population of Malmö (sampled in a survey or questionnaire) should be aware that 100% of the municipal car fleet is “clean” or that the city is well on its way there.
- At least 10% of the population sample that owns a car should be able to indicate a connection between the demonstration and their own thoughts about clean vehicles in general as well as be able to answer a question about the environmental benefits of “clean” cars.
- At least 5% of the population sample that owns a car should be able to answer a question like the following “*How will the fact that the city has 100% clean vehicles influence your decision-making the next time you consider buying a car?*” with a response similar to “*Now that I have seen that “clean cars” actually work and are feasible, I will take a look at such cars at the car dealers.*”

A2 Description

Prior to SMILE the increased use of clean vehicles was hindered by a lack of information about alternatives, higher investment costs, the uncertainty of which fuels were available and the reliability of this availability in the future.

The process of procuring and leasing vehicles within the City of Malmö is as follows:

- VISAB, a City-owned company, buys or leases vehicles for the City.
- This company in turn leases vehicles to City departments, offices, etc.
- Each City department or office best knows the functionality of the vehicles that are required for its needs. Therefore each department or office should specify their needs and state these to VISAB who then procures vehicles at more competitive prices based on various agreements.
- The central City office and/or the City Council determines car use and/or procurement policies and guidelines that each City department or office should follow when considering functionality. Exceptions to following the central policies are permitted but must be justified.

In practice in the area of transport it is the experience of the technical evaluator that prior to the start of SMILE central policies regarding vehicles were circumvented by middle-level managers. During SMILE it would appear that ignorance of the policies or deliberate

intransigence declined significantly, however whether this was caused by this measure or not was not included in the scope of this technical evaluation. Possible answers to this question should be sought in the process evaluation data base and process evaluation data collection coordinated by BOKU as part of GUARD's work.

The goal is that the City of Malmö, via the process described briefly above, will procure 250 clean vehicles. Instead of using their own private cars when on duty or otherwise at work employees will instead use the clean city-owned vehicles for all work-related personnel and light freight transport.

On average a typical City of Malmö car or light vehicle is driven 20 000 km per year. The total mileage will be approx. 5 million kilometres per year, 20 million kilometres in four years for the 250 procured light vehicles.

As stated previously, the demonstration effect is the most important aspect of the activity; the vehicles will be clearly marked as environmental vehicles and highly visible during daytime in the traffic in Malmö. According to the author(s) of the DMP: since many people use the City fleet vehicles the positive experience of the vehicles is spread more widely compared to if 250 vehicles were bought for private use (the City of Malmö has 18 000 employees and potential users). For the City employees, no alternative to clean vehicles will be available therefore strengthening the action and its impact. The psychological effect was expected to be considerable. Furthermore, expectations about and experience from the measure will be spread to the business sector and the public as part of the myriad of activities conducted within the mobility management measure 11.1.

The implementation was to be carried out in the following steps:

- Procurement
- Regulations
- Specification of vehicles
- Tender
- Information and marketing campaigns
- Evaluation

B Measure implementation

B1 Innovative aspects

- **New mode of transport exploited, locally**– Prior to SMILE a 100% clean vehicle municipal or city car fleet was unknown in Sweden. With 100% clean vehicles in the light car fleet there will be no alternative than to use these cars. [NB: While the DMP states that an objective is 100% clean fleet it is physically impossible for this to be realised during SMILE even if all cars, without exception, that were purchased during SMILE were clean because not all pre-existing cars were replaced during SMILE]
- **Demonstration effect, locally** –The use of these vehicles will be highly visible, through markings and slogans on the cars, and this will mean that citizens and present car drivers in Malmö will see these cars on a daily basis. This will enhance awareness and acceptance for cleaner vehicles. Since many people use these vehicles as a part of the municipal car fleet the positive experience of the vehicles is spread more widely compared to if individual car users bought 250 vehicles.

B2 Situation before CIVITAS

At the start of the project some fleet vehicles were clean and ran on biofuels (essentially E85) or on natural gas (sometimes on a mixture of biogas and natural gas instead). The city of Malmö adopted a new definition of clean vehicles in 2002 and had a goal to have 50% clean vehicles according to the new definition by the end of 2004. This goal was not reached. When the original application for SMILE funding via this measure was drafted about 32% of the light cars in the municipal fleet were clean vehicles according to the 2002 definition. On 31 December 2004 the City had 489 light vehicles of which approximately 33% or 161 vehicles could be considered clean and the rest or about 328 were conventional petrol-fuelled vehicles.

B3 Actual implementation of the measure

A distinction must be made between procurement of so-called clean vehicles that was on-going prior to SMILE and continued during the SMILE timeframe and the subsequent actual implementation of the measure that first commenced when stability in the measure leader role was realised. Therefore the measure had the following implementation history.

Stage 1: Measure delay (*February 2005 – Spring 2006*) – During this period rapid succession of measure leaders meant that in practice the measure was not actively pursued. Despite this clean cars were procured and taken into use but not because of measure 5.1 *per se* but presumably because of ongoing trends and interests that were present prior to the start of SMILE. These interests coincided with those central to SMILE measure 5.1.

Stage 2: Measure implementation (*Spring 2006 – Autumn 2008*) – During this period there were two successive measure leaders who worked actively with this measure. The percentage of procured cars that conformed to the intentions of this measure and City policy ambitions rose. Stage two consisted of three parts:

A. Procurement which was conducted by VISAB.

Two figures showing the cumulative procurement of vehicles appear on the following page. In all 333 vehicles were procured during SMILE months 1-43 of which 313 were designated clean vehicles.

B. Marketing which was conducted by various actors.

An example of marketing material placed external to SMILE appears below.

C. Coordination activities carried out by the measure leader.

As can be seen on Figure 2B on the following page, not all cars procured during the duration of SMILE were considered clean vehicles. It would appear that in most cases this is because there was no version of vehicle models which met the specifications or other special needs that the relevant city department had. An example: the rescue services needed (or claimed they needed) small pick-up trucks or similar high riding vehicles for staff in charge of fire fighting or rescue operations. Such vehicles needed to negotiate terrain off-road or rough roads. Apparently there are no “clean” versions of such vehicles on the market at present.

Figure 1: Example of marketing/information on the Internet



Figure 2A: Cumulative number of clean vehicles by type between Smile month 1 and Smile month 2. The upper line in the graph shows the growth in numbers of all clean cars.

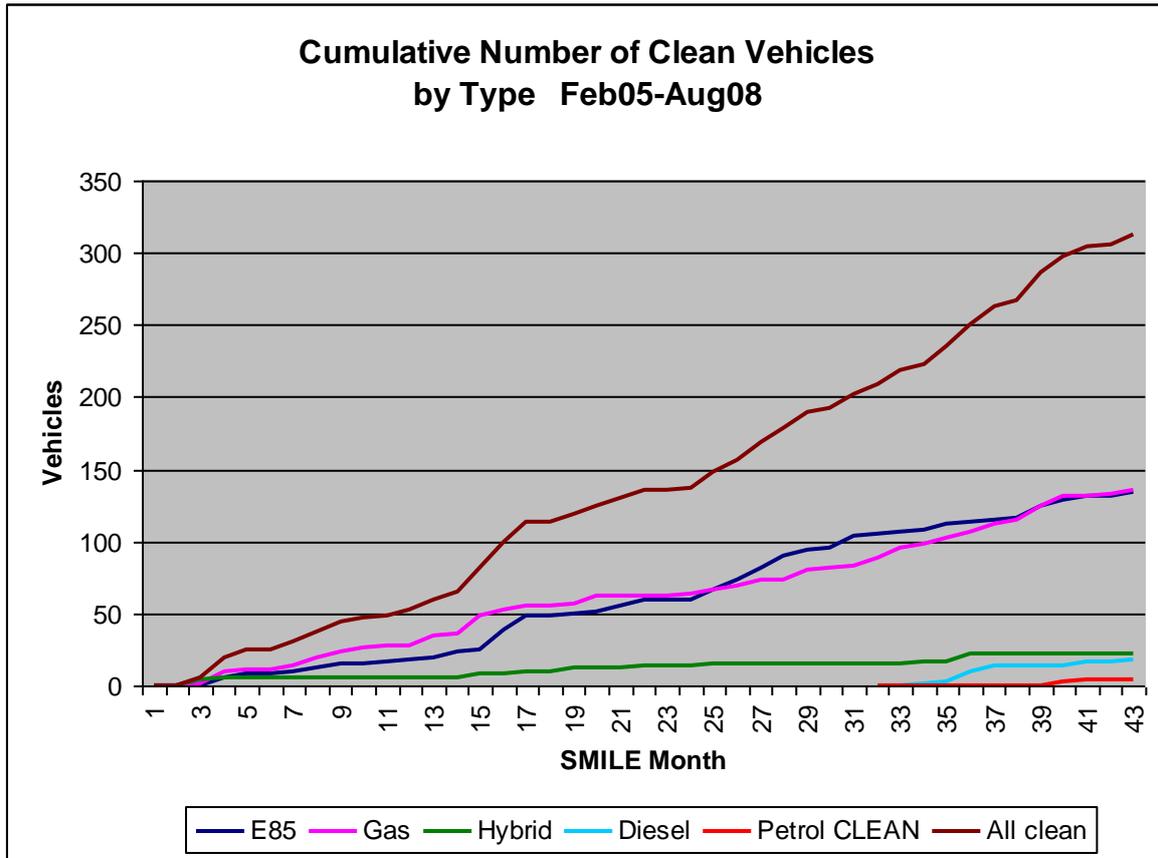
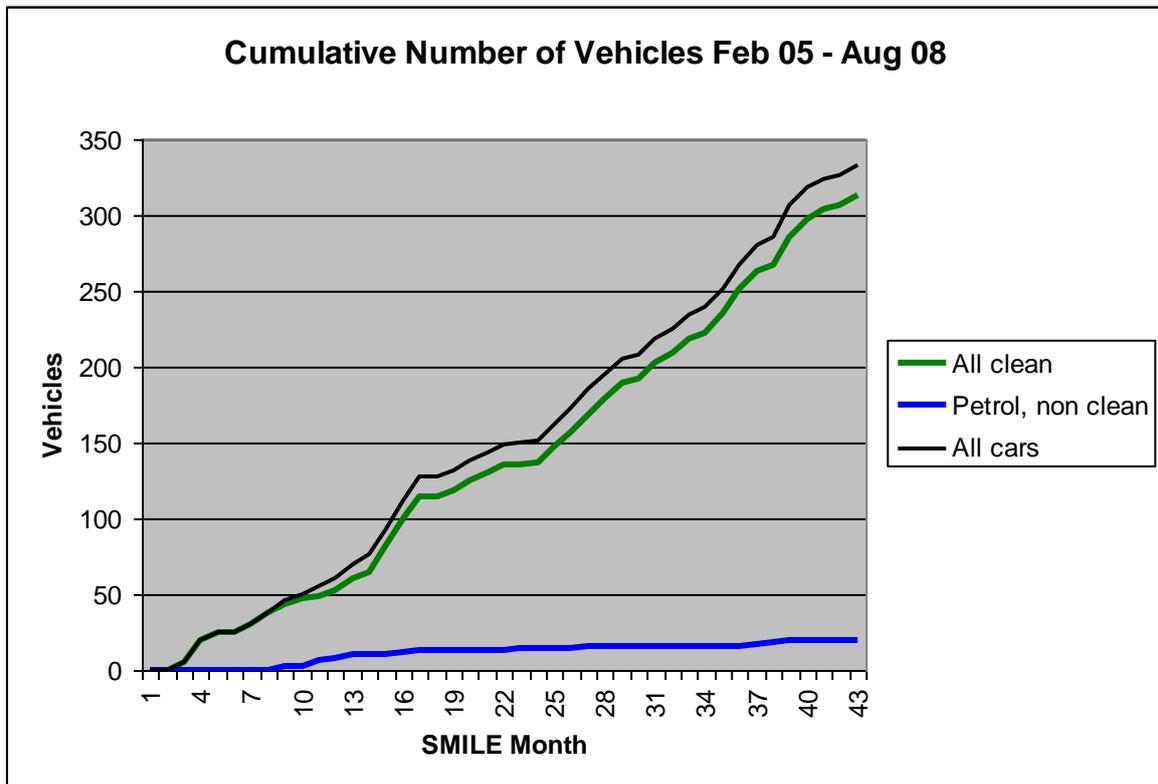


Figure 2B: Cumulative number of vehicles Smile month 1 to Smile month 43.



B4 Deviations from the original plan

The deviations from the original plan comprised:

- **Deviation 1: At least one year delay** – Lack of a long-term dedicated measure leader coupled with the difficulties in finding such a staff member meant that full work on this measure was delayed at least one year, if not 18 months, during the start of SMILE.
- **Deviation 2: Lack of formal plan and implementation methodology** – It would appear from the DMP and from discussions with the initial, temporary measure leaders during 2005 that there was no formal plan and implementation methodology in place to execute this measure. It would seem that there was uncertainty as to what the measure leader's role should be and where the responsibility of lobbying City Offices and Departments to contribute to the measure should lie in practical terms. During 2005 and into 2006 the technical evaluation staff asked what strategy there was to realise the measure objectives – i.e. to concentrate a marketing effort on key parts of City Administration or to lobby all members of upper management, or to work with VISAB to gently “veto” the requirements for the cars issued by the departments that would otherwise have lead to continued procurement of mostly conventional cars, or a combination of all the above – and it was apparent at these early stages that there was no strategy for actual implementation. During the middle and later stages of the measure some plan crystallised and in addition to cooperation with VISAB collaboration was also sought with the parts of measure 11.1 run by the Department of Streets and Parks that attempted to promote mobility management processes and thinking internally within the City itself.
- While Deviation 2 is not a deviation from the original plan *per se*, in a sense the lack of clear a strategy and implementation methodology appears to deviate from many other SMILE measures in Malmö where implementation in practice was planned for prior to the start of SMILE and if measure leaders discovered flaws or short comings in delivery methodology etc they took steps to improve the original planning. Perhaps the central problem is that the original measure leader -- or at least the person envisioned as the measure leader prior to the actual start of SMILE -- did not pass on his/her implementation plan/strategy to one or more of the numerous measure leaders during the first year of SMILE. Perhaps definitive answers to matters concerning this can be found in the process evaluation coordinated by BOKU as part of GUARD's work.
- **Deviation 3 not all vehicles that were procured were clean.** – This is discussed in section B3. One reason for this could be that no clean vehicles were available on the market for very special vehicle needs on the part of specialised city departments.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- There is a relationship with eco-driving for municipal employees (measure 11.2) and marketing clean cars via “subsidised parking” (measure 7.1) which could help the demonstration effect.
 - Another potential relationship is the biogas provision to the net and the use of natural gas (measure 5.2) for some of the vehicles in this measure.
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C Evaluation – methodology and results

C1 Measurement methodology

C1.1 Impacts and Indicators

Table 1: Table of Indicators.

Nr.	INDICATOR Name	Possible DESCRIPTION	DATA /UNITS	How measured?
1	Measure revenues	Revenues from the implementation of the measure	SEK	Measure leader asked
2	Measure costs	Costs (within SMILE) for the implementation of the measure	SEK	Measure leader asked
8	CO ₂ emissions	CO ₂ per vkm	G/vkm, derived	Based on emissions calculated
10	NO _x emissions	NO _x per vkm	G/vkm, derived	Based on emissions calculated
11	Small particulate emissions	Pm10 per vkm	G/vkm, derived	Based on emissions calculated
MSE-5	Demo effect 1	Awareness of municipal clean fleet on part of general public	Percentage and/or absolute numbers	Survey/equivalent
MSE-6	Demo effect 2	How much the car-owning public know about the clean cars, etc.	Percentage and/or absolute numbers	Survey/equivalent
MSE-7	Demo effect 3	How likely the car-owning public are to consider buying a clean car in the future (& how this effected by the clean fleet)	Percentage and/or absolute numbers	Survey/equivalent
MSE-28	% of vehicles vkm that are run on biogas	% of vehicles vkm that are run on biogas	Percentage and/or absolute numbers	Estimated

Detailed description of the indicator methodologies:

- **Indicator 1** (Revenues from the measure) – There are no revenues from this measure. There are reduced costs for fuel for the majority of vehicles in this measure compared with more conventional light vehicles.
- **Indicator 2** (Measure costs) – The costs of the measure include costs for staff, marketing and information materials as well as the additional costs entailed in purchasing clean vehicles. Data obtained from measure leader and VISAB. Indicator number in parenthesis is the estimate for the entire cost of the measure at the end of month 52.
- **Indicator 8** (CO₂ emissions) – This is the estimated emissions of CO₂ from the vehicles.
- **Indicator 10** (NO_x emissions) – This is the estimated emissions of NO_x from the vehicles.
- **Indicator 11** (Small particulate emissions) – This is the estimated emissions of PM10 from the vehicles.
- **Indicator MSE-5** (Demo effect 1) – The awareness of the clean municipal fleet on the part of the general public was ascertained through surveys.
- **Indicator MSE-6** (Demo effect 2) – The awareness of the clean municipal fleet on the part of the car-owning general public was ascertained through surveys.
- **Indicator MSE-7** (Demo effect 3) – How likely the car-owning public is to consider buying a clean car in the future (as a result of the demonstration in the clean municipal fleet).
- **Indicator MSE-28** (% biogas) – The percentage of vehicles that are run on biogas and an estimate of how many vkm that biogas cars actually run on biogas.

C1.2 Establishing a baseline

The first assumption is that approximately 33% of all cars in the City fleet were considered “clean” prior to February 2005. The figure 33% is adopted since when the SMILE application was drafted about 32% of municipal cars were “clean” and at the time SMILE commenced approximately 34% were clean.

The second assumption, based on information provided by the city, is that each vehicle runs approximately 20 000 km/year. This would mean that with approximately 489 light vehicles in total on 31 December 2005 that about 9.8 million km/year were driven by City employees in their light vehicles on City business.

The third assumption is that the 67% of all light vehicles in the fleet that were “dirty” were overwhelmingly fuelled with petrol and that of the 33% of the then “clean vehicles” the breakdown of vehicle type per fuel or power source was as follows: Electric or electric hybrid 2%, E85 49%, Gas 49%. The justification for 2% electric or electric hybrid follows in the box below.

Box 1: A short history of electric and electric-hybrid cars in Malmö prior to SMILE.

During the latter 1990s and continuing during 2000 Malmö and other organisations in Skåne participated in and ran a programme to introduce electric cars. Some 80 electric vehicles were purchased of which about ¼ were owned and used by the City of Malmö. These twenty-some electric vehicles were driven on average some 4500-6500 km/year (KFB Rapport 2000:13 Elbilar i Skåne, Per Brännström) as opposed to other light vehicles used in Malmö. Because of problems with battery replacements and costs some of these vehicles were gradually decommissioned in the years leading up to SMILE. The City purchased a small number of electric-hybrid vehicles prior to the start of SMILE. This is the background to the assumption that approximately 2% of all light vehicles were electric or electric hybrid prior to the start of SMILE.

The fourth assumption is that none of the vehicles had diesel engines. Compared to many other countries in Europe, cars and other light vehicles in Sweden very seldom were diesel powered in the years leading up to SMILE. If there were any such vehicles in use they were very few.

This leads to the follow distribution of vkm according to vehicle type on the (fifth) assumption that all vehicles were driven approximately the same distance each year:

- 6 566 000 km driven with “dirty” petrol light vehicles
- 64 680 km driven with electric or electric hybrid vehicles
- 1 584 660 km driven with E85 vehicles (running on E85 or petrol)
- 1 584 660 km driven with gas vehicles
(that primarily run on natural gas or vehicle gas which is a mixture of natural gas and biogas
but since the exact mixture at the time is not known at present we assume 100% natural gas)

To establish emissions some further assumptions are required to complete the baseline:

- Vehicles using ethanol are fuelled 67% of the time using E85 with an 80% reduction of CO₂ compared to petrol. The rest of the fuel is petrol.
- Gas vehicles are fuelled 67% of the time using natural gas and 33% using petrol. While the gas supplied to the gas vehicles may have contained biogas, the gas will be assumed to be 100% of fossil origin as of 2004.

- Electric vehicles existed at the end of 2004 in Malmö as the result of previous campaigns to introduce these cars. However, these cars generally have a shorter range and were probably used infrequently as suggested in the box above. For the few electric and electric hybrid vehicles we will assume 50% of the emissions for petrol as a very rough approximation of the situation.

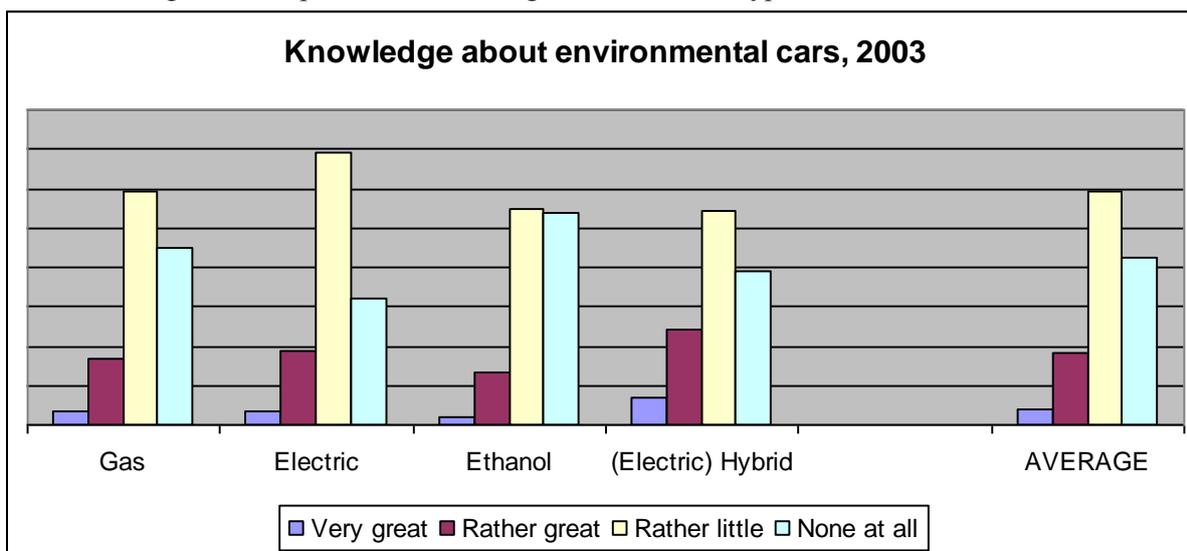
This would mean that City’s cars (light vehicles) emitted the following on a yearly basis during the end of 2004/start of 2005:

Table 2: Emissions from the Malmö City fleet end 2004/start 2005 i.e. the baseline.

	E85	Gas	Electric/ elec hybrid	Conventional petrol	Total
CO ₂	139700 kg	260740 kg	6210 kg	1247500 kg	1654190 kg OR ~1654 metric tons
NO _x	60610 g	60610 g	1810 g	361130 g	484170 g OR ~484 kg
PM10	6340 g	4210 g	130 g	26260 g	36950 g OR ~37 kg

Concerning awareness and acceptance we can rely on the 2003 public survey of over 3000 inhabitants in Malmö conducted by the Department of Streets and Parks combined with the use of clean cars in actual practice. There survey results suggest that in Malmö the awareness and acceptance levels of “clean cars” was as follows:

Figure 3: Respondents’ knowledge about different types of environmental cars

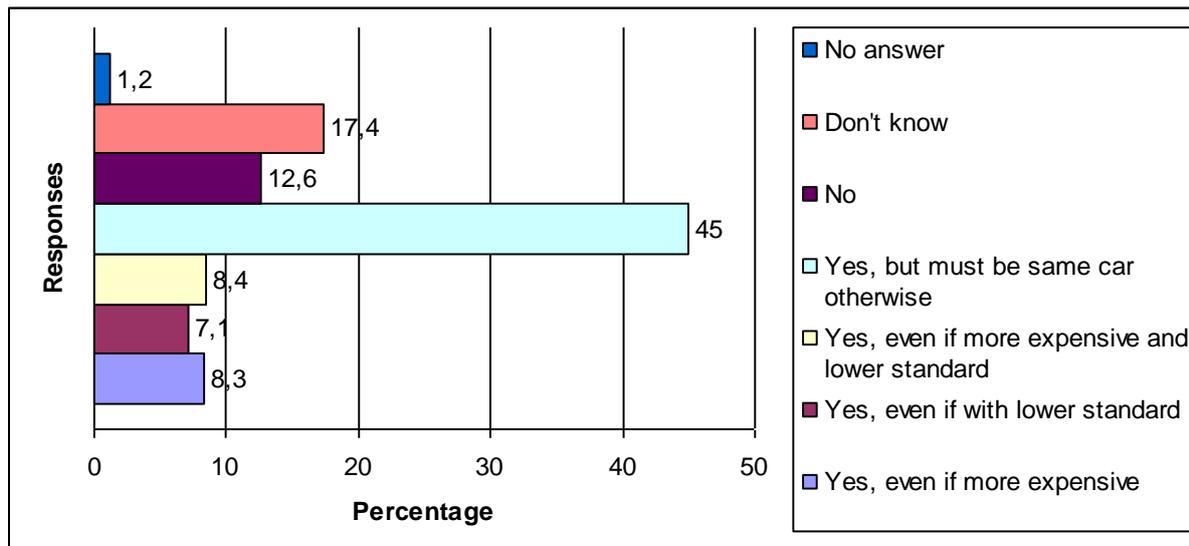


Self-assessed knowledge among the general public appears to be greatest concerning electric-hybrid cars and electric cars when compared with gas and ethanol cars. On average 3.3% of the public claim to have a very high degree of awareness about environmental cars while 14.7% have some degree of awareness.

There is some kind of irony that five years after the survey the types of cars that had somewhat less awareness (gas and ethanol) were the types of cars purchased in greatest numbers by the City of Malmö for its fleet as part of 5.1 and strongly dominated the purchasing choices on the part of the general public in Sweden as a whole.

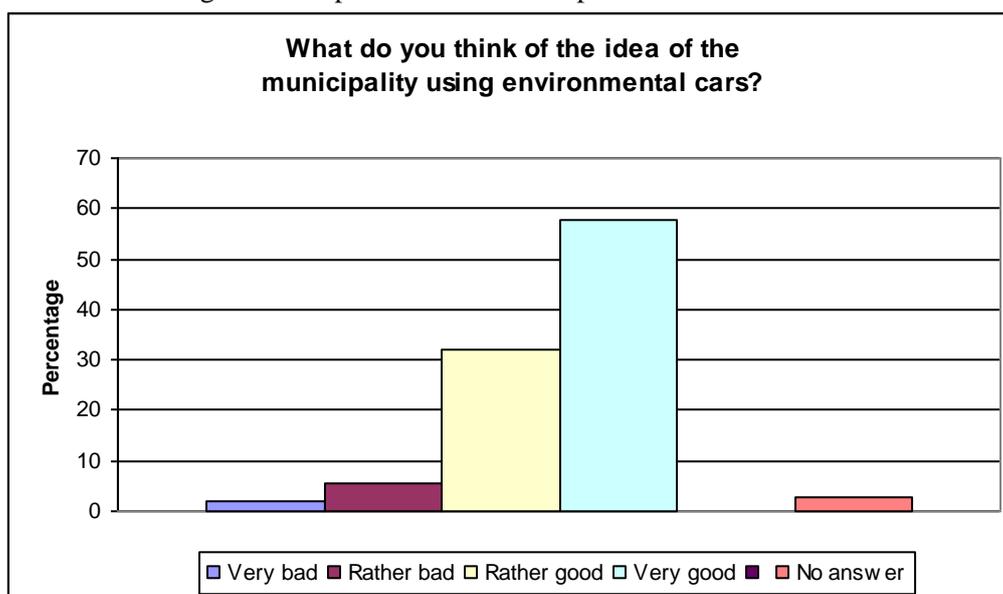
When asked whether they would buy a car which used another fuel/power source than solely petrol the following answers were provided: 68.8% yes, 30% said no or didn’t know. These answers can be seen broken down into more categories below:

Figure 4: Would you buy a car with another fuel?



The public was also asked about their opinion about how to improve traffic and the environment in Malmö. Respondents were given a number of options to evaluate, one of which was increasing the amount of environmental cars in the municipal fleet.

Figure 5: Responses about municipal uses of environmental cars?



Approximately 90% of the public were positive or very positive to the idea. Here we see that acceptance of the SMILE measure already before it was started was very high.

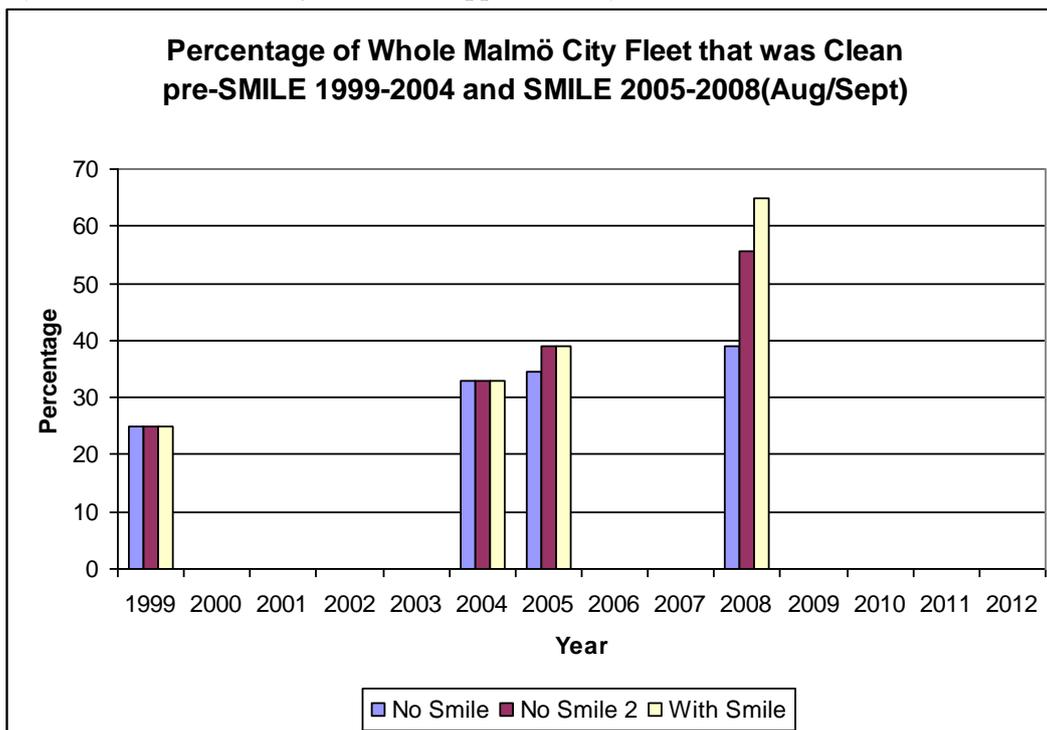
Awareness and acceptance on the part of municipal employees was not measured prior to the start of SMILE or the actual implementation of this measure because the principle objective of this measure in the initial DMP was that awareness and acceptance on the part of the general public was of greatest importance.

C1.3 Building the business-as-usual scenario

Two primary questions guide the formulation of the scenario: 1) what if the SMILE measure 5.1 was not carried out, and 2) how should we deal with changes in society awareness about climate and environmental issues not connected to SMILE during particularly 2006-2007?

The first question is important but as we shall see that are at least two possible scenarios.

Figure 6: Differences between the two business-as-usual scenarios and actual developments. Note that for 1999, 2004 and 2005 the figures are for the 31st of December in each respective year but for 2008 the figures are for approximately mid October.



In Figure 6 the columns “No SMILE” means that there was no SMILE measure. “No SMILE 2” means a variation on this business as usual assumption.

As can be seen in Figure 6, the percentage of light vehicles in the city fleet that were “clean” in 1999 was about 25%. At the end of 2004 this had grown to about 33%. From the end of 1999 to the end of 2004 this means that the percentage of the fleet that was clean grew by about 0.133% per month, assuming a constant level of increase. (Note: the fact that the city changed its definition of clean vehicle in 2002 has been left out of this discussion.) Scenario “No SMILE” is thus that the rate of growth of clean vehicles would be about 0.133% per month.

Between the end of 2004 (just prior to when SMILE started) to the end of 2005 (the 11th month of SMILE) the percentage of the fleet that was clean grew to approximately 39% which, on a monthly basis is about 0.5% per month. Between the end of 2005 and month 43 of SMILE the percentage of the fleet that was clean grew to approximately 65% which, on a monthly basis is about 0.9% per month.

The scenario “No SMILE 2” takes the 0.5% growth rate per month during the first 11 months of SMILE and applies this to the coming 22 months of SMILE. During the first 11 months (actually perhaps the first approximately 15 months) there were a succession of measure leaders, often in name only, and it is difficult to say that these measure leaders actually worked on the 5.1 measure during this initial period.

What we can say is that if the rate of growth from the end of 1999 to the end of 2004 is taken as a baseline then the business as usual scenario “No SMILE” would be that 39% of the fleet would be clean as of the end of SMILE month 43. In comparison with the level achieved by the end of SMILE month 43, 65%, this points to a marked improvement. However, the growth of clean vehicles in the fleet during the 5 years prior to SMILE may not have been very even – ie the assumed 0.133% per month. Instead the growth rate may have accelerated gradually from under 0.1% per month towards approximately 0.5% per month during this five year period.

If instead we take the assumptions in “No SMILE 2” as the basis for our construction of the business as usual scenario, the effects of the SMILE measure 5.1 appear to be rather much smaller and is the difference between the middle and right columns during year 2008 in Figure 6 (actually up until the middle of October 2008) or 55.5% clean if No SMILE 2 versus 65% clean with the SMILE 5.1 measure.

This means that depending on the assumptions either there was an approximately 66% increase in the number of clean cars thanks to SMILE (39% versus 65% of the entire fleet was clean) or there was only about a 17% increase in the number of clean cars thanks to SMILE (55.5% versus 65% of the entire fleet was clean). Further, this means that emissions in a business as usual scenario would vary by a very wide margin depending on which assumptions are used.

Table 3A: Emissions in the “No SMILE” business as usual scenario. 633 cars of which 39% were clean in SMILE M43

	E85	Gas	Hybrid	Diesel	Efficient petrol	Conventional petrol	Total
CO ₂	183510 kg	426740 kg	33180 kg	50690 kg	6460 kg	1436400 kg	2002710 kg OR 2002.7 metric tons
NO _x	56210 g	56470 g	9680 g	54410 g	2370 g	308900 g	488050 g OR 488 kg
PM ₁₀	8450 g	5650 g	690 g	4580 g	240 g	30890 g	50500 g OR 50.5 kg

Table 3B: Emissions in the “No SMILE 2” business as usual scenario. 633 cars of which 55.5% were clean in SMILE M43

	E85	Gas	Hybrid	Diesel	Efficient petrol	Conventional petrol	Total
CO ₂	261150 kg	416220 kg	47220 kg	72130 kg	9190 kg	1047870 kg	1853770 kg OR 1853.7 metric tons
NO _x	79990 g	80370 g	13770 g	77430 g	3370 g	225350 g	480280 g OR 480.3 kg
PM ₁₀	12030 g	8040 g	980 g	6520 g	340 g	22530 g	50440 g OR 50.4 kg

When calculating the effects in C2.3, both scenarios will be used to establish an upper and a lower limit level of effects of the measure in terms of emissions.

The second question on page 10 “how should we deal with changes in societal awareness about climate and environmental issues not connected to SMILE during 2006-2007 particularly?” is much more difficult to answer. Media coverage of certain issues combined with the previously mentioned 10 000 SEK rebate on clean cars decided upon by the government after the start of SMILE were NOT part of the business-as-usual incremental improvement of clean car purchasing and ownership yet these activities and parameters are also external to SMILE. Furthermore, since these events or activities targeted or came to influence private car owners and users directly and apparently more effectively than 5.1 -- which via the city demonstration effect would work to change perceptions and habits on the part of the general public – the changes wrought by the measure would appear to have become dwarfed by external changes.

While the change in composition in the city fleet would have occurred with or without SMILE, a factor common to the SMILE, “No SMILE” and “No SMILE 2” scenarios is the distance travelled by the vehicles and the total number of vehicles in service. The number of vehicles in service as part of the fleet has grown during SMILE and this growth is unrelated to the SMILE measure. This means that even if all vehicles in the fleet ultimately become clean vehicles, as long as the total fleet size increases, and the vehicles continue to drive ever increasing distances as a whole, at some point the positive effects with regard to emissions reductions, as shown in Figures 7 and 8 for example, will at some point begin to decrease at a fleet level even if emissions per vkm continue to decline.

There is one final matter to consider in building the business as usual scenario: namely awareness and acceptance given a lower percentage of clean vehicles in the fleet. We cannot know the change in awareness and acceptance but we can assume that awareness numbers would have risen both in conjunction with a greater percentage of clean vehicles in the fleet (more vehicles means a greater chance of seeing the vehicles and being reminded of their existence) and because of the general media interest in climate and environmental related issues especially during the latter part of 2006 to the early part of 2008.

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport. The numerical development of the procurement and use of vehicles can see in Figures 2A and 2B on page 5 under section B3.

C2.1 Economy

Since the original DMP did not have goals concerning economic results, indicators for this measure were not deemed necessary in the initial local evaluation plan. Subsequent developments within SMILE and GUARD showed that all measures would be required to provide revenues and expenses for each measure.

Revenues: This measure has no revenue if revenue is taken to mean income generated by the measure.

The expenses for this measure are related to the personnel costs for the measure leader and various marketing or information materials etc. Expenses do include possible extra expenses for procurement, administration of ownership/or leasing a greater variety of car types, possible extra costs for maintenance etc. Measure 5.1 can recover 35% of the extra cost for procurement as a SMILE expense.

Possible reduced expenses for fuelling vehicles are not included in this part of the report since the latter changes are defined as not being part of the measure *per se* but rather an indirect result of the measure.

Costs: Seen in this light the costs for this measure total approximately 9 400 000 SEK during the duration of SMILE based on the table below.

Table 4: Approximate cost breakdown for the SMILE measure 5.1, vehicles until SMILE month 43, other cost categories until SMILE month 48.

Type of cost	Additional costs of vehicles*	Salary of measure leader**	Other costs***
Cost in SEK	9 132 435 SEK	€ 26 000	- SEK

* Notes and explanation concerning additional costs of vehicles.

1. This is the total additional costs in the purchase price as paid by VISAB from February 2005- August 2008 (of which 35% of this can be recovered using SMILE funding). Note that these costs may not be the same as reported otherwise as part of other data collection exercises within SMILE or CIVITAS.
2. The figure of “Additional costs of vehicles” will ultimately be higher by the end of SMILE whereas the other two cost categories are in all likelihood unchanged. Please note that for the additional costs of vehicles provided by Jan-Olle Persson from VISAB, via the various measure-leaders, that the costs do not include VAT.
3. Finally, the clean diesel and clean petrol only vehicles procured by the City during 2008 are not eligible for cost recovery but are considered clean vehicles in the context of this measure and by the City of Malmö. This means that there are no “additional costs” for these vehicles included here.

** Notes and explanation concerning Salary of measure leader

This is the budgeted salary for 4 years: actual costs are not available at this time.

*** Notes and explanation concerning Other costs.

No data was available at this time.

Such costs – for internal marketing etc -- were presumably very small and may have been borne jointly or in conjunction with measure 11.1

C2.2 Energy

There are no energy indicators of relevance to the stated objectives in the original DMP or in the present version of the measure. New, more fuel-efficient petrol vehicles with low emissions use less fuel than the cars that were replaced. The objectives of the measure, however, focus on the demonstration effect, awareness, acceptance, and to lesser extent emissions reductions. This means that measure of fuel use is not an integral part of the evaluation of this measure. Furthermore, measure 11.2 eco-driving among municipal employees may lead to reduced fuel usage. Possible attempts to gauge reduced fuel usage as the result of this measure (5.1) run the risk of including the success and reductions of fuel use from this other measure (11.2).

C2.3 Environment

In theory since there were no quantifiable environmental goals from this measure, there should be no evaluation of this. However in anticipation of objections on the part of others and the potential “failure” of the demonstration effect, it was decided early on in the drafting of the evaluation plan to look into emissions.

The present (October 2008) level of emissions, based on the present fleet size and mix of vehicles in the fleet, is approximately as follows if extrapolated to a yearly basis (i.e. this is can be considered an approximation of the emissions for 2008).

Table 5: Derived emissions for 2008.

	E85	Gas	Hybrid	Diesel	Efficient petrol	Conventional petrol	Total
CO ₂	316100 kg	735660 kg	46080 kg	63720 kg	8720 kg	822120 kg	1992400 kg OR 1992 Tons
NO _x	96820 g	147130 g	13440 g	68400 g	3200 g	176800 g	505700 g OR 505 kg
PM ₁₀	14560 g	14710 g	960 g	5760 g	320 g	17680 g	53990 g OR 54 kg

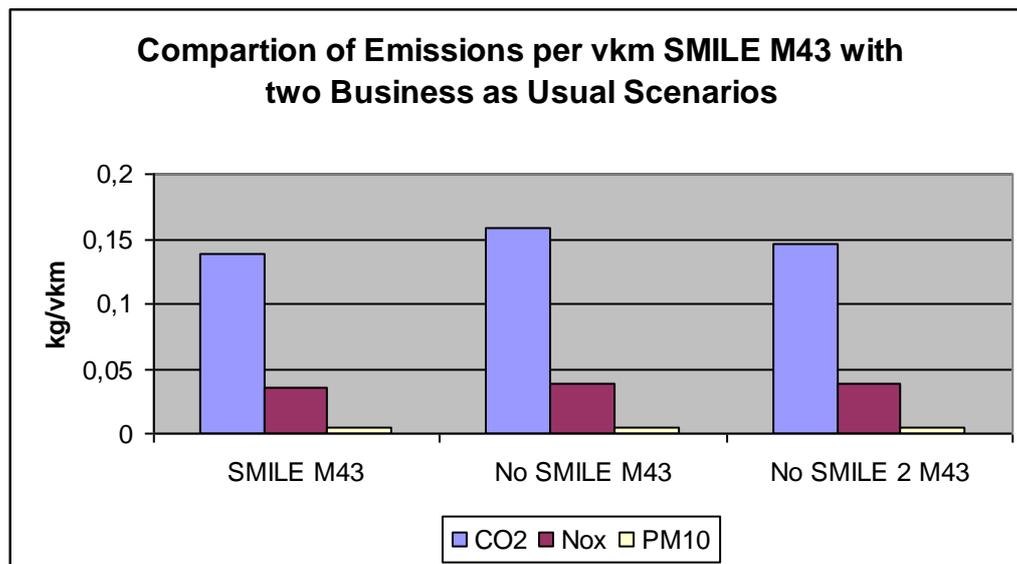
Since the business as usual scenario contains two variations (“No SMILE” and “No SMILE 2”), upper and lower limits in the range of changes in emissions can be found below. These values are obtained from Tables 3A, 3B, and 5 and are also depicted graphical in Figure 4.

CO₂ emissions may have been reduced by as little as 92834 kg/year or 7.3 g/vkm and may have been reduced by as much as 241776 kg/year or 19 g/vkm.

NO_x emissions may have been reduced by as little as 24.26 kg/year or 1.9 mg/vkm and may have been reduced by as much as 32.03 kg/year or 2.5 mg/vkm.

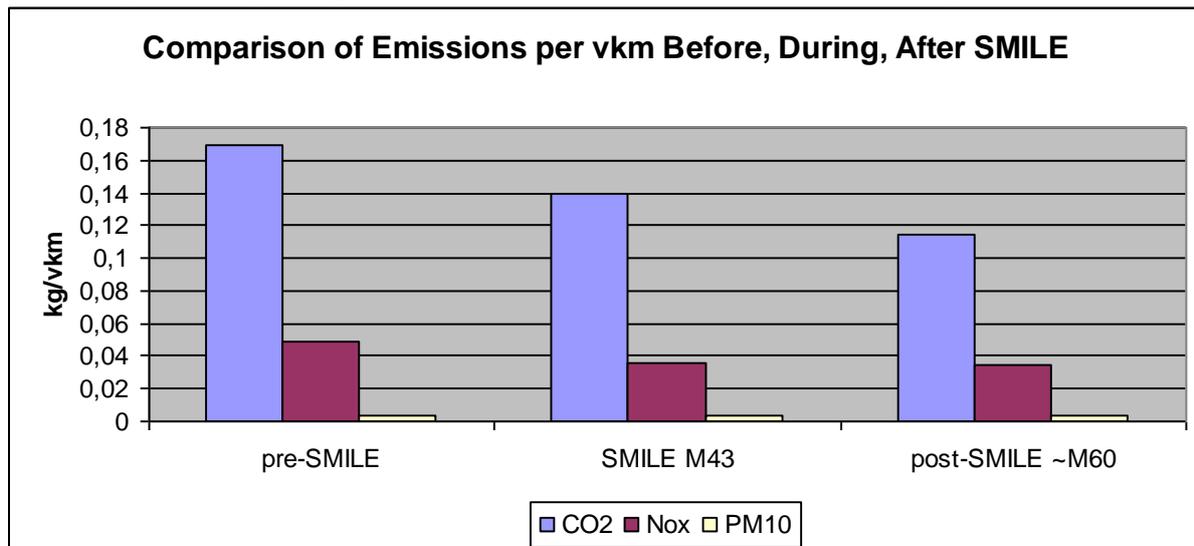
PM₁₀ emissions may have been reduced by as little as 1.426 kg/year or 0.112 mg/vkm and may have been reduced by as much as 1.485 kg/year or 0.117 mg/vkm.

Figure 7: Graphic representation of indicators 8, 9 and 11 comparing the two business as usual scenarios with the situation during SMILE month 43



The following figure extends the perspective to an estimated situation approximately 12 months after the end of SMILE, i.e. “month 60” or January 2010.

Figure 8: Graphic representation of indicators 8, 9 and 11 Before, During and After SMILE



Data for the post-SMILE period, i.e. ~M60 can be found under section D4 concerning Future Activities, Table 8 on page 25.

These extrapolations are based on the assumption of continuing trends in the number and kinds of vehicle procurement and current rates of vehicle retirement. Small changes in the trends are, naturally, very likely and therefore emissions figures for Month 60 should be taken with caution.

Note on a potential additional environmental indicator: noise

Some of the car models deemed “cleaner” are rated as quieter than the car models that were replaced. Particularly at slow speeds, like those in traffic flows in central areas of Malmö, many vehicles may have average speeds of 50 km/h or less where the drop in noise levels from say an individual electric-hybrid compared to an individual conventional car could, in theory, be measured. Since the percentage of cars in Malmö traffic that are owned and operated by the City is very low compared to all cars in city traffic then the change in noise levels from traffic cannot be observed at this time.

C2.4 Transport

During 2007 just over 13% of all new car purchases in Sweden were of ethanol/petrol or gas/petrol or electric/petrol hybrid cars.¹ In the county of Skåne, where Malmö is located, the equivalent figure is just under 11%.

Since Sweden is a long country with large areas with low population densities, it would be a fairer comparison if Skåne (Malmö) was compared with other counties with the largest urban areas, i.e. Stockholm and Göteborg. In Stockholm County the equivalent figure is about 17.5% and in Västra Götaland County, where Göteborg is located, the figure is just under 15%. (Source: Rapport 5820. “Index över nya bilar klimatpåverkan 2007” Swedish EPA, April 2008) While we lack the exact figures for Malmö itself, the comparison with both the whole country and with comparable highly urbanized counties suggest that purchases of clean light vehicles in general in Malmö is not higher than the Swedish average and is may be lower than comparable urban areas in Sweden².

¹ The distinction between the number of 17.8% on page 1 and this figure on page 13 is that the former includes energy efficient petrol-only vehicles whereas the latter excludes these.

² However, the figures for comparing Stockholm county, Västra Götaland County and Skåne County (the locations of Stockholm, Göteborg and Malmö respectively) only reflect to varying degrees the respective city's patterns of new car purchases. Stockholm and suburbs clearly dominate Stockholm County and the percentage of the county population that

This, in turn, suggests that **the demonstration effect has not been discernable in Malmö**. An alternative is that cities such as Göteborg and Stockholm have had similar campaigns for replacement of their municipal fleets which have been more successful and, as a result, a demonstration effect has occurred there (higher figures for cleaner cars there than the average) which cannot be noted in Malmö.

In Stockholm County it is reasonable to assume that part of the explanation for the high figure is the effect of taxation (fees) for unclean cars entering the environmental zone for light vehicles in and close to the city centre.

Factors that influence the decisions concerning car purchases on the part of households are many and variable. As has been suggested elsewhere in this report the demonstration effect in Malmö has been overwhelmed by other trends and decisions in Sweden. While this evaluation has no evidence of a demonstration effect, perhaps the lower than average percentages of alternative cars purchased in and around Malmö compared to the country as a whole and comparable urban areas actually includes the demonstration effect. By this it is meant that without 5.1 maybe the percentage of light vehicles running on alternative fuel sources in and around Malmö might have been lower than observed. Again, there is no evidence of this in the evaluation since the methodology adopted and data collected do not directly support this speculation.

The only other indicator under this rubric is the number of vehicles in service and their split between “clean” and “dirty”. Here we can say that if present trends continue then the goal of a 100% clean municipal fleet will not be achieved by the end of SMILE but that just under 70% of all the vehicles will be clean by the end of SMILE. Furthermore, given present trends, it will be first possible in 2012 or 2013 for the entire fleet to be considered essentially “clean” according to present definitions of clean vehicles.

C2.5 Society

Awareness and acceptance of this measure were assessed in several ways including questions posed in a pre-study conducted in the somewhat related measure 7.1 during the beginning of SMILE. This 7.1 pre-study, that was part of an attempt to establish a baseline for 7.1, attempted to interview potential purchasers of clean cars while the purchaser was in a car dealership or at the entrance to a car dealership. The purpose of the pre-study was to gauge the effect of “free parking” with regard to attitudes to and actual purchasing of clean cars which would be eligible for free parking.

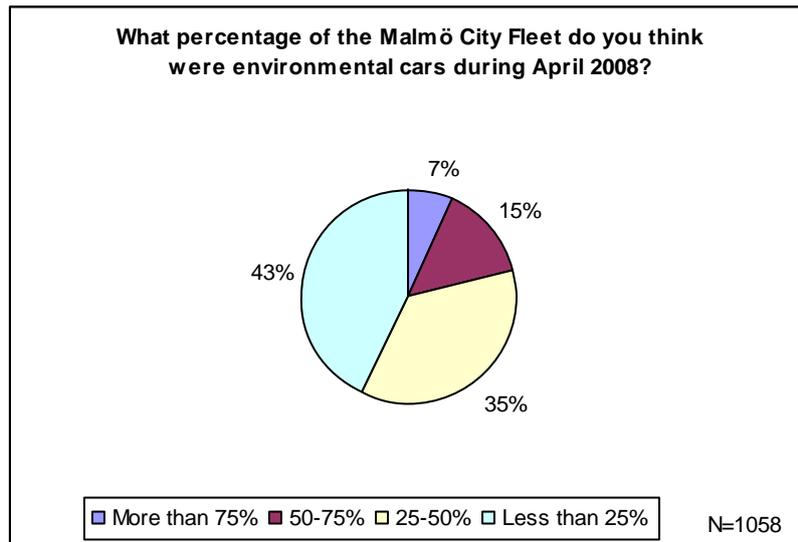
During April and May 2008 people over 3000 people were asked questions about SMILE measures as part of the SMILE General Public Survey. Different questionnaires were used in different circumstances. Three questions in the survey were of greatest relevance for this measure.

Figure 9:

Q: What percentage of the Malmö City Fleet do you think were environmental cars during April 2008?

A: 3: Less than 25% 2: 25-50% 1: 50-75% 0: More than 75%

lives outside Stockholm and its suburbs is rather small. Göteborg and its suburbs consist of a very sizeable population in the Västra Götaland County. In the case of Malmö and its suburbs, this urban area has less than half of the entire population of Skåne County. This may be an explanation why the three largest cities in Sweden, using statistics taken by proxy from the Counties, show some divergence.

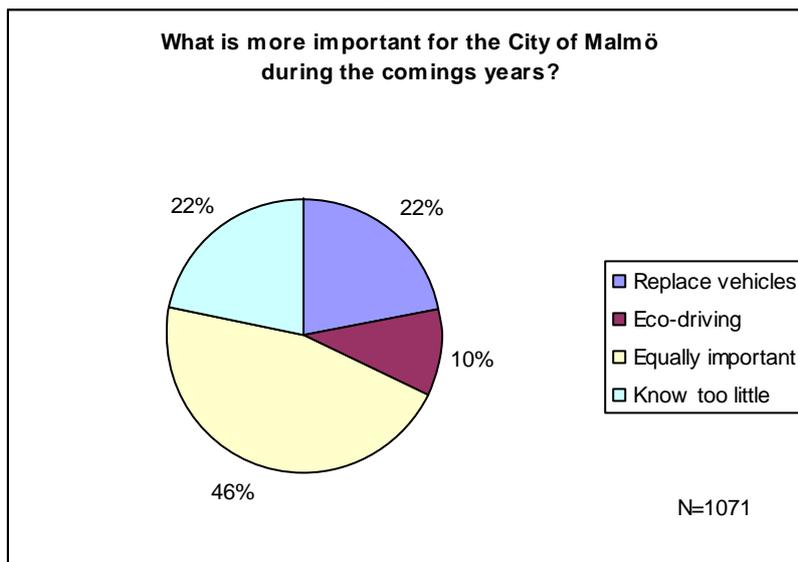


The average answer was 2.15. This suggests that the median percentage is approximately 34%. This is interesting since this percentage would have been correct if asked at the very start of SMILE. This might mean that the public’s awareness underestimates the number of clean vehicles in the fleet and that awareness lags by over three years. This is another indicator that the so-called demonstration effect is difficult to find in this measure.

Another question was the following which attempted to gauge the public’s opinion of the relative importance of eco-driving and new, cleaner vehicles to reduce emissions.

Figure 10:

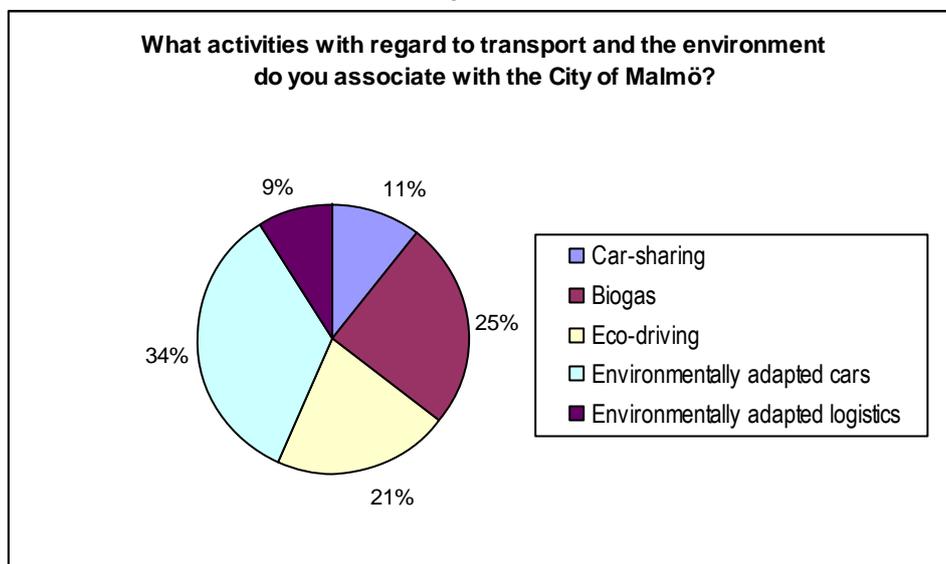
- Q: What is more important for the City of Malmö during the coming years?
- A: 3: Replace more of the city’s cars and make them environmental cars
 2: Train more employees in eco-driving
 1: Both are just as important for the environment
 0: [I] know too little to have an opinion



Here we see a greater acceptance to replace vehicles (5.1) than eco-driving. Awareness and acceptance of the importance of both vehicle replacement and eco-driving can be seen by this being the most frequently chosen answer among the alternatives.

Finally the survey asked respondents to link organisations with measures taken to reduce environmental impacts from transportation. Response rates to these questions were much lower than most other questions. Respondents could mark more than one activity as related to a given organisation which means that we cannot know the exact number of respondents. With regard to the City of Malmö we see the following responses:

Figure 11:



The largest response was concerning environmentally-adapted or “clean” cars at 34%. It is not clear, however, whether this response is concerning an association of an organisation (in this case Malmö) with knowledge about actual practice or whether this is an expression of an association that respondents would like to happen or suspect is happening. It is therefore difficult to attach great weight to these responses. However the response surely reflects some awareness of the growing clean car component of the municipal fleet.

In part of the study for measure 7.1, respondents were asked what influenced their opinions of and possible decision about purchasing a new car. 7.1 concerned free (turned out to be subsidized) parking for environmentally friendly vehicles in Malmö. Respondents were asked questions in or just outside car dealerships.

One of the questions asked dealt with a possible demonstration effect on the part of municipal light vehicles. While some of the respondents noticed that some municipal vehicles could run on gas or ethanol, this part of the study could find no evidence of a connection between “noticing” and “being influenced to buy” which **suggests that the intended demonstration effect in the SMILE application was either not grounded in actual practice, overly optimistic or seriously inflated.**

At the time of the pre-study in 7.1 the clean cars at most dealerships tended to be at the back of the showroom. Some dealerships began to market the advantages of owning an environmental car and the possibility for free parking was part of the message. Later, as part of an effort to stimulate purchasing of environmental cars on the part of the general public, the Swedish Government announced a 10 000 Swedish crowns rebate on environmental cars which, presumably, made marketing arguments about free parking less interesting on the part of the public. Clean cars started to occupy central locations in car dealership showrooms at some point. Because of changes in measure 7.1, our timing of the evaluation tasks could not keep up with these rapidly changing developments that would have benefited measure 5.1.

C3 Achievement of quantifiable targets

Table 6: Overview of objectives, targets, problems in linking evaluation to objectives via targets as well as degree of success of the measure based on its initial description and plan.

Objective Number.	Target	Rating
1	The DMP only specifies increased awareness and no quantifiable targets were set. A hypothetical target suggested by the technical evaluator in 2005 follows under point A.	0
2	The DMP only specifies increased acceptance and no quantifiable targets were set. A hypothetical target suggested by the technical evaluator in 2005 follows under point B.	NA
3	The DMP only specifies reduced emissions and no quantifiable targets and for which pollutants were set. The technical evaluator decided that emissions calculations for CO ₂ , NO _x and PM10 could be relevant here.	A - NoT
4	Procure 250 or more clean vehicles.	***
5	That 100% of the City's vehicles would be clean by the end of SMILE	0
6	Demonstration effects lead to private people purchasing their own clean cars after seeing that the municipality has taken a lead in this area. A possible target established by the technical evaluator in 2005 follows under point C.	NA / 0
<p>NA = Not Assessed 0 = Not achieved * = Substantially achieved (> 50%) ** = Achieved in full *** = Exceeded A – No T = Assessed but no target to compare with</p> <p>A. At least 20% of the population of Malmö (sampled in a survey or questionnaire) should be aware that 100% of the municipal car fleet is "clean" or that the city is well on its way there. B. At least 10% of the population sample that owns a car should be able to indicate a connection between the demonstration and their own thoughts about clean vehicles in general as well as be able to answer a question about the environmental benefits of "clean" cars. C. At least 5% of the population sample that owns a car should be able to answer a question like the following "How will the fact that the city has 100% clean vehicles influence your decision-making the next time you consider buying a car?" with a response similar to "Now that I have seen that "clean cars" actually work and are feasible, I will take a look at such cars at the car dealers."³</p>		

C4 Up-scaling of results

Up-scaling of results could involve any of the following or combinations thereof:

1. Measure is completed to 100% in the years following SMILE.
2. Enforcement mechanism is in place and strictly enforced so that employees ALWAYS use part of the City fleet while on duty or working and do not use their own private car, ever, for City purposes
3. The City of Malmö changes its definition of clean cars so that a distinction is made between clean cars for internal, city use and other cars used by the public and companies. The internal definition is stricter in terms of emission requirements and other measures so that the original intention of a demonstration effect can be seen and is promoted despite other changes in society since the start of SMILE.
4. The City of Malmö works with neighbouring municipalities and cities as well as local offices of national government administration/government organisations to spread the use of clean cars as a part of an organisation to organisation campaign. A similar kind of campaign could be realised in conjunction with other large organizations in Malmö. This would lead to a greater total number of vehicles that are cleaner.

³ The reader should note that points A-C at the bottom of the table were not official quantifiable targets within the context of SMILE but hypothetical targets discussed once with one of the measure leaders. With regard to objective 1 since it has been physically impossible for the municipality of Malmö to reach a 100% clean fleet during SMILE, even if all new cars were clean, the hypothetical target cannot be used for assessment purposes. Point B has not been able to be used as a means to assess fulfilment of objective 2. The reader should return to page 1-2 and note that none of the objectives are quantified with the exception of Objective 5 which is not possible to achieve. The figure of 250 vehicles in Objective 4 was added in later by one of the measure leaders and the then site manager. Point C became largely irrelevant to pursuer following the 10 000 Swedish crowns environmental car rebate program established by the Swedish government while SMILE was on-going.

5. In conjunction with 9.1 the City of Malmö could actively seek collaboration with Sunfleet and similar service providers of clean cars in cases when City cars are not available because of service or when temporary extra needs for cars arise. Otherwise there is a risk that employees might use their potentially non-clean private cars on official business during such circumstances. This fall back to “bad behaviour” might become permanent for some employees which would undermine results.
6. Ease of access: some employees might find use of their own private cars appealing since there ease of use in conjunction with work tasks is very high. The city should work to resolve existing problems where at times the location of the parked clean cars owned by the city for employee use and the location of the workplace involves a significant distance and therefore time loss. Such time loss results in resistance to using the city owned cars when one’s own car is parked right outside.

C5 Appraisal of evaluation approach

The approach adopted and used collects the most salient data for the indicators. The data collection methodology and the data quality are sufficient for the needs of the technical evaluation of 5.1. The evaluation approach was based on the project’s objective as expressed explicitly in the original DMP.

Changes that may have occurred in measure implementation that could have impacted on the results of this report were included in communications with the two principle measure leaders during the main part of the measure implementation. Other, more temporary, measure leaders were difficult to obtain meaningful information from during the first year of SMILE.

The evaluation approach could perhaps have been enhanced if a selection of the then middle level managers in the city administration were interviewed at the start of SMILE and during 2008 to determine changes in their awareness and acceptance of the measure. However, since the principle goal of the measure has been the so-called demonstration effect on the general public, this was not planned for when the technical evaluation plan was drafted.

It has been assumed that new, clean vehicles procured and taken into use have replaced pre-existing petrol-fuelled vehicles. In many circumstances this has surely been the case but some of the new vehicles may have replaced pre-existing vehicles that did not run solely on petrol: ie some clean SMILE cars have replaced pre-SMILE clean cars.

It would have simplified and made the evaluation process easier if an employee at VISAB had been appointed the measure leader and thus the principle contact. SMILE administrative tasks that might have been overwhelming at times for VISAB could have been shouldered by either the Dept of Environment or Department of Streets and Parks as appropriate.

The original plan to evaluate this measure was to follow in more detail the actual procurement and use of vehicles in two departments that were representative of all city departments. However with the rapid turnover of measure leaders during the first year of SMILE and that the measure leader at the start of 2006 stated that there was no plan to work with specific departments to accelerate retirement of cars and lobby for their replacement with 100% clean cars, this plan had to be abandoned. Since the plan for measure and its marketing was not very well articulated at the time, the evaluation methodology changed to taking whatever data proved available at the city-wide level.

While the evaluation approach has proved largely successful despite difficulties outlined elsewhere in this report, the evaluation has been forced to depart significantly from the original plan and, for example, place much emphasis on emissions reductions which were considered a secondary objective in the measure description.

The author of the description for this measure in the CIVITAS application placed great emphasis on the demonstration effect which is something that subsequent measure leaders downplayed significantly in the actual implementation of the measure. Events external to the measure proved important in influencing the public to purchase environmental cars. We can say that it would have been possible to attempt to lift an analysis of the demonstration effect into the forefront of the evaluation, but this would not have conformed with the interest and approach of the measure as subsequently pursued by the measure leaders during SMILE.

C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** – 313 clean light vehicles were procured up to and including month 43 which means that the goal of procuring 250 clean light vehicles was exceeded by a wide margin. The City of Malmö has approximately 630 light vehicles as of the end of September 2008 which means that, together with clean vehicles still in use from prior to SMILE, about 65% of all City cars, vans, mini-buses and light trucks can be considered clean. This means that the goal of 100% clean vehicles was not attained before the end of SMILE. In all likelihood the goal of 100% clean vehicles will never be achieved completely (because of there being no car models available to fit certain special needs) but for all practical purposes can be considered to be reached during 2011 or 2012, depending on the continuation of current procurement trends .
- **Key result 2** – The most important part of the measure, which according to the original measure description as it appeared in the DMP was the demonstration effect, cannot be found. This suggests insufficient planning, wishful thinking in the application process or inflated but completely ungrounded expectations. In part the absence of a measurable demonstration effect may be the result of factors external to SMILE, ie extensive media coverage of climate and environmental concerns, the 10 000 SEK rebate on environmental cars, etc.
- **Key result 3** – Reductions in emissions as the result of the measure were approximately the following (expressed as both absolute levels and per vkm):
CO₂: Reductions ranging from 92830 to 241780 kg/year or between 7.3 to 19 grams/vkm
NO_x: Reductions ranging from 24 to 32 kg/year or between 1.9 to 2.5 milligrams/vkm
PM10: Reductions on the order of approximately 1.4-1.5 kg/year or between 0.11-0.12 milligrams/vkm
- **Key result 4** – Awareness and acceptance (**without the demonstration effect**) were improved during the measure. However there is some uncertainty about how much weight can be attached to this result since the questions in 2003 and 2008 were posed differently and in different circumstances.
- **Key result 5** – This measure has led to significant changes in the composition of the municipal fleet and has clearly put the City of Malmö on course for a 100% clean fleet during the start of the next decade. However this has been achieved, in part, through factors external to the measure.
- **Key result 6** – There has been a serious lack of congruence between the original stated measures and what this measure has actually achieved. This means that this measure should have been evaluated differently to better reflect the achievements. While ultimately originating from the measure design and lack of quantifiable objectives, factors originating outside the measure overwhelmed the “demonstration effect” that was supposed to be the measure’s centrepiece.

D Lessons learned

D1 Barriers and drivers

D1.1 Barriers

- **Barrier 1** – It is difficult to achieve a strong indirect effect – demonstration effect leading to changes in consumer attitudes and behaviour – and this difficulty was not foreseen in the original DMP, or the planning process leading up to the SMILE application. Alternatively this difficulty was foreseen but not given sufficient thought.
- **Barrier 2** – Rapid turnover of measure leaders during first 12-18 months meant no continuity and no implementation in a meaningful way. Information and experience transfer lagged or was poor between measure leaders at key points in the implementation of the measure.
- **Barrier 3** – Unclear division of responsibilities for the marketing/lobby activities necessary for the measure where the Department of Streets and Parks, the Department of the Environment (where the measure leader is/was located) and VISAB apparently lacked a clear approach to burden sharing and marketing during initial parts of SMILE.
- **Barrier 4** – Unclear or non-existent strategy/plan/methodology to actually achieve procurement and subsequent use of vehicles as planned. The high level of procurement that has occurred may have been the result, in part, of activities and factors external to SMILE.
- **Barrier 5** – Lack of enforcement method to make sure that City Departments/Offices comply with the intentions of the measure and fulfil city policy documents both in terms of car procurement, technical specifications concerning car requirements stated by the Departments and in terms of actual use of the cars in everyday practice where it is highly likely in some circumstances private cars may still be in use for city business at this point in time based on past experiences and practice within parts of the city administration.
- **Barrier 6** – Apparently slower turnover of existing vehicles than originally anticipated. In the planning for the measure it would appear very likely that it was assumed that most, if not all light vehicles used by City employees would be replaced every third or fourth year. This observation is not based on explicit formulations but appears to be an implicit assumption. This would mean that during a four year period all vehicles would be replaced and that it would be a great opportunity to ensure that new vehicles were cleaner. However, some city departments and offices retain their vehicles for periods of time much longer than the duration of SMILE which means that lower rates of vehicle retirement have been a barrier to the goal of achieving a 100% clean fleet.
- **Barrier 7** – lack of properly defined and quantifiable objectives poses a difficult if not impossible task to perform a correct evaluation of the measure to determine its success.
- **Barrier 8** – Stage 2 measure implementation shows that not all new procured vehicles during the measure have been clean vehicles. This somewhat contradicts the objectives 5 and 6 and does not fully correspond with the innovative aspect of local demonstration effect. A possible reason for this – a lack of vehicles on the market that could meet specific user needs - has been discussed in section B2.

D1.2 Drivers

- **Driver 1** – A project driver *may be* increased availability of in the first instance E85 and in the second instance “vehicle gas” a 50-50 mixture of fossil natural gas and renewable biogas. Put another way: this might not be a driver but it certainly means that a barrier was removed.

- **Driver 2** – Events and financial incentives external to SMILE which at first assisted and then had overwhelming influence on the ultimate goal of new car procurement on the part of the general public being increasingly cleaner models and brands.
- **Driver 3** – Pressure placed indirectly on procurement officers within city departments and their bosses to better fulfil the measure intentions and pre-existing policy documents. This pressure came from factors outside the measure (for example media coverage of climate issues).
- **Driver 4** – According to the present measure leader, pre-existing policy documents and routines that assisted in the implementation of the measure could be used as support to give legitimacy to the measure. This was however only possible once there was sufficient continuity in the measure: i.e. rapid measure leader turnover ceased.
- **Driver 5** – according to the measure, approximately 90% of public were positive or very positive of the idea of municipal use of clean vehicles.
- **Driver 6** – higher than envisaged procurement of clean vehicles is a good driver to show the success of this particular objective and could provide good marketing for wider application of this measure.

D2 Participation of stakeholders

While some stakeholders have participated in the measure, their degree of participation has varied considerably from very active to *initially* at least rather passive. Mention of the stakeholders does not imply a certain degree of activity, influence or interest but is simply a list. **Stakeholders:** VISAB, Department of Streets and Parks (some assistance in measure marketing as part of internal activities in 11.1), Department of Environment (measure leader location), various heads of city departments, offices, divisions and their procurement officers, etc. How the degree of participation on the part of various heads of city administration departments, procurement staff etc was increased was not dealt with in the technical evaluation and the reader should consult GUARD's process evaluation database for insight into this subject.

D3 Recommendations

- **Recommendation 1** – That the DMP of the measure should have been revised or improved to ensure the deletion or perhaps modification of the demonstration effect when events external to SMILE proved so overwhelming in reaching the ultimate target group i.e. the car-owning general public.
- **Recommendation 2** – In applications of the type like SMILE and in everyday city administration business/projects, the objectives must be more quantified in terms of amounts, geographic scope and deadlines. Further that these objectives should have clear owners that also have been provided with at least a general description of how the objectives can be practically achieved. Therefore, 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.
- **Recommendation 3** – That relevant people in the City of Malmö administration place much more weight in making sure that potential measure leaders with sufficient time and experience are found and reserved prior to the start of an EU project like SMILE and that in the event of circumstances that remove the measure leader from the post that relevant people in the administration seek to employ new staff to immediately take up the work which will otherwise lag and jeopardise measure fulfilment. This measure has been one of the worst together with 11.2 in terms of measure leader turnover.

Having said this it must be mentioned that the two measure leaders at the Department of Environment who presided over the measure during the latter 2/3 of SMILE have roughly achieved objectives 4 and 5 – and hence also objective 3 – despite the difficulties that they faced in terms of among other things time-constraints and the initial lack of a marketing plan to operationalise this SMILE measure. That objectives 1 and 2 have not been realised, at least within the measure framework, are primarily the results of flaws in the original description and planning of the measure combined with external events and factors that were not foreseen during the planning of the measure.

- **Recommendation 4** – The demonstration effect that was the key focus in the original DMP has been hard to find and may have been a very tenuous relationship. Future projects should be very cautious about funding changes in the types of vehicles private people owned based solely on an indirect approach and should instead more directly influence the choices, habits and possibilities for car owners. Alternatively a measure that seeks to change vehicle ownership should have more direct effects at the centre of a list of measure objectives and operationalisation where the objectives are quantifiable and with a clear timetable.
- **Recommendation 5** - It would have simplified and made the evaluation process easier if an employee at VISAB had been appointed the measure leader and thus the principle contact. Administrative tasks that might have been overwhelming at times for VISAB could have been shouldered by either the Dept of Environment or Department of Streets and Parks as appropriate. By not giving the evaluation staff direct access to VISAB when assigning measure leadership roles, collection of some data became round-about and took more time and effort than necessary in an exercise that otherwise should have been straightforward and simple. This is especially true during the first half of SMILE, prior to the last measure leader assuming the role.
- **Recommendation 6** – At some point diminishing effects from the procurement of primarily clean vehicles will start to occur. This is because the total number of vehicle and their use appear to rise on a yearly basis. This means that while emissions per vkm will continue to fall, total emissions may very likely rise. The following recommendations may help to reduce emissions from the entire fleet. The City might consider one or more of the several options below:
 - A. Shift procurement habits towards vehicles with both lower CO₂ and NO_x emissions per kilometre.
 - B. Consider new ways for city employees to execute their tasks and jobs in ways that require less total travel, thus reducing the total travel distance for each vehicle in use.
 - C. Reorganise city administration so that the need for travel decreases.
 - D. Have a program in place so that all city employees regularly take refresher eco-driving courses/instruction to reduce fuel consumption and thereby reduce emissions from the fleet.
 - E. Have a mechanism in place to reduce use of fleet vehicles for non-job trips (if this is a problem).
 - F. Seek to reduce emissions from traffic that is not part of the City fleet.
- **Recommendation 7** - The technical evaluation of measures that lack quantifiable objectives or where it is discovered early on in the evaluation process that the few quantifiable objectives that are stated are physically impossible to achieve because of flaws/mistakes in the measure design or similar problems should be used as a review prompt during the project.
- **Recommendation 8** – to increase awareness and acceptance amongst the inhabitants of Malmö expectations of the effects of local demonstrations could be supplemented by a marketing campaigns and activities to promote clean vehicles and their benefits.
- **Recommendation 9** – the high level of procurement which has occurred should be used to market this measure to other governmental and private organisations, especially in relation to Objective 1 of Measure 9.1.

D4 Future activities relating to the measure

The evaluator is unaware of additional future activities related to the measure. Presumably the ultimate goal of an absolutely 100% clean fleet will be worked upon during the coming years.

As discussed previous under section C2.3 Environment, the effects of measure 5.1 will in all likelihood continue during some period of time after the conclusion of the measure. Based on the assumption of the continuation of current rates of vehicle retirement together with procurement patterns and choices for new vehicles it can be estimated that during Month 60 (12 months after SMILE) some 685 vehicles will be in use with the following emissions per kilometre:

Table 8: Estimated emissions of the Malmö City fleet at beginning of 2010

CO ₂	0.1149	kg/vkm
NO _x	0,034791	kg/vkm
PM ₁₀	0.003871	kg/vkm

At this time some 77% of the fleet will be classified as clean.

However while emissions per vkm will continue to fall, total emissions will ultimately rise because of the larger fleet and the greater number of total km driven by the fleet on a yearly basis. For ways to reduce emissions per vkm after SMILE see recommendation 6 under section D3.

E Appendix and Data Sources

Two Excel files containing calculations accompany this report when sent to TTR.

In addition the following sources of data were used in the compilation of this report:

- Untitled presentation held during the spring of 2008 by Bertil Moldén the CEO of Bil Sweden which is the national association of vehicle manufacturers and importers. This presentation was about the market for environmental cars during 2007 and future expected models and trends.
- KFB Rapport 2000:13 Elbilar i Skåne, Per Brännström
- Rapport 5820. "Index över nya bilars klimatpåverkan 2007" Swedish EPA, April 2008
- VISAB, various Excel-sheets listing car procurement. Obtained from Anna Jersby, Roland Zinkernagel, Stina Nilsson, et al in their role as measure leader at various points during the life of the measure.
- Interviews/correspondence with Roland Zinkernagel, measure leader, at various points during spring 2006
- Correspondence with Anna Jersby, measure leader, at various points during 2007-2008
- www.miljofordon.se, example of marketing as provided by Anna Jersby, measure-leader, summer 2008.