Measure title: **Freight Driver Support**

City: **Malmo** *Project:* **SMILE** *Measure number:* **10.1**

A Introduction

Malmö Lorry Centre (hereafter referred to as Malmö LBC) is a major player in the Malmö transport market, operating 150 vehicles a day in the city of Malmö, as well as on long distance trips. It has access to 250 heavy goods vehicles and 300 drivers, organized under 180 independent vehicle-owner companies.

The business is divided into three main business areas: long-distance distribution, express delivery services, and crane and construction services. The type of goods is full-load, mainly construction material, food and drink products, and pharmaceuticals.

Malmö LBC has the ambition to lower the environmental impacts of their business, such as fuel consumption and emissions related to that, as well as reducing the number of unloaded kilometres.

For these reasons, Malmö LBC has decided to install a system of vehicle computers that provides data on fuel consumption, emissions, and other environmental impacts, which can be used to follow up on the drivers driving performance.

The same vehicle computers should also be used to provide data that would allow for optimization of goods distribution and transport planning, as well as loading of goods on the vehicles. This would influence decreasing the number of unloaded kilometres, which also would have positive effects on the environment.

On long distance transports there's no need for optimization, since about 95 percent of the transports are 100 percent loaded. But, there is potential to reduce the unloaded kilometres on the express delivery and distribution services, as well as construction and material transports, where the level of loading is about 60-70 percent. The Malmö LBC expected to be able to increase this level about 10 percent due to better transport planning and real time control of where the vehicles are situated in relation to customers and incoming orders.

A1 Objective

The measure objective is to establish vehicle/driver support as a concept that enables an efficient and optimal transport planning with a minimised environmental impact on citizens and nature in the city of Malmö.

Installing vehicle computers is expected to bring several positive effects, as mentioned in the *Short Description of Measures, 10.1 Freight Driver support*. These effects can be classified into three groups, as below:

Fuel efficiency
Reporting and evaluation of vehicle fuel consumption and emissions would indirectly contribute to decreased emissions of the greenhouse gas CO_2, which is one of the aims of the measure.

More efficient route and transport planning

Data on vehicle movements and loads would be used to optimise goods distribution and transport planning, as well as loading of goods on the vehicles. This is expected to improve the level of loading by 10 percent on the vehicles in express delivery, distribution, construction and material transports. The aim of the measure (before redefinition) was to reduce the unloaded vehicle kilometres by 2.31 M km/year.

Improved communication with customers, drivers and other players in the transport sector
The above mentioned data would be used for helping customers to analyse and plan more resource efficient transport. It would also improve the work environment for the drivers, since they get a direct feedback on their work performance: fuel efficiency, efficiency of loading and levels of emissions caused by their driving. The process of developing and testing the vehicle computers, interacting with suppliers, public authorities and other stakeholders, would strengthen the relations with the different players in the transport sector.

A2 Description

The initial aim was to test functionality of the concept of vehicle/driver support by installing vehicle computers in 150 heavy lorries during the project period. However, the measure has turned in to a technology development project.

After redefinition of the scope, this measure was set up to test vehicle computers in seven lorries in order to develop the most optimal vehicle computer system to match the needs of Malmö LBC, as described above.

The functionality of the equipment was found to be such that it could not at this stage function adequately to record the data required by Malmo LBC and this became a technology development project rather than a project evaluating a properly functioning piece of equipment.

B Measure implementation

B1 Innovative aspects

Innovative Aspects:

- New organisational arrangements or relationships
- Use of New Technology / ITS

The innovative aspects of the measure are:

- **New organisational arrangements or relationships** – Malmö LBC with its 180 individual businesses will be the largest organisation in the transport sector to influence its businesses and take the initiative for a more sustainable traffic situation in Malmö
- **Use of New Technology / ITS**, monitoring in the same equipment both vehicle data (fuel efficiency) and transportation parameters (transport planning)

B2 Situation before CIVITAS

Before the measure, Malmö LBC had no system in place that could provide efficient feedback on the environmental consequences of driving behaviour, such as fossil fuel consumption and emissions. Neither was there a system for capturing data that could be used to optimise goods distribution and transport planning, as well as loading of goods on the vehicles.

Although, Malmö LBC provided already very efficient transportation of long-haul goods, there was a substantial potential to reduce the unloaded kilometres on the express delivery and distribution services, as well as construction and material transports, as described in the introductory section.

B3 Actual implementation of the measure

Malmö LBC joined the CIVITAS SMILE project in October 2005. The implementation of the measure started in January 2006.

The measure was implemented in the following stages:

Stage 1: Screening and selection of supplier *(2006-01 – 2008-02) – The selection started with a screening of potential suppliers of vehicle computers, out of which two were chosen for testing and evaluation: Locus TDX Mobile and Vehco Co-driver. Malmö LBC tested Locus TDX mobile and a collaboration partner, Akka Frakt, tested the other one. After that, Malmö LBC even tested the Vecho Co-driver. The test results were compiled and reported.*

Malmö LBC found that none of the vehicle computers was satisfactory on both required parameters: vehicle data (fuel, emissions etc) and route planning. The difficulties to find a vehicle computer with satisfactory data capacity brought on new dimensions to the process. In order to fit the new circumstances, the selection stage was prolonged and the scope was redefined, as explained in B4, Deviations from the original plan.

Stage 2: Test and evaluation of selected supplier *(2008-03 – 2008-09) – Malmö LBC decided to test the Locus TDX mobile. The computer was installed in seven vehicles. Evaluation results in September were still not satisfactory.*

Stage 3: Agreement on joint development of vehicle data *(2008-09 – 2009-01) – Malmö LBC and Locus agreed on a joint development contract for a vehicle computer that will match the needs of Malmö LBC. This stage will continue until January 2009.*

B4 Deviations from the original plan

The deviations from the original plan comprised two successive redefinitions of the scope of the measure:

- **Redefined scope:** Deviation from the initial plan was due to the conclusion that there was no supplier of vehicle computers that could provide the data that Malmö LBC needed in order to fulfil the objectives, described in A1. This conclusion was based on the evaluation of three suppliers, out of which two (Locus TDX Mobile and Vehco Co-driver) were selected for detailed testing and evaluation.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **Measure 11.9 (Heavy Eco-Driving)** – The vehicle computer that is installed in measure 10.1 is a necessary tool to create an efficient feedback system and follow up on the results of the Heavy Eco-Driving education.

C Evaluation – methodology and results

C1 Measurement methodology

Because the scope of the measure changed to one of technological development the ambition of the evaluation was scaled back. There were indications from the technical development that the equipment would be valuable in providing in-cab driver advice to reinforce the economical driving style of drivers who had already received eco-driving training. Indicators relating to more efficient route and transport planning were not required as this function is not working well enough to be tested.

C1.1 Impacts and Indicators

Table of Indicators.

Nr.	*Relates to GUARD Nr.*	*INDICATOR Name*	*Possible DESCRIPTION*	*DATA /UNITS*
8		*CO_2 Emissions*	*Total emissions of CO_2 in the business*	*kg of CO_2, derived*

Detailed description of the indicator methodologies:

- **Indicator 8** *(CO_2 Emissions)* – Derived data on CO_2 emissions per litre fuel, using a fixed conversion factor from fuel to CO_2: 2.61.

C1.2 Establishing a baseline

For effects relating to "*fuel efficiency*" the fuel consumption of Malmö LBC before the implementation of the measure, year 2005, is used as a base-line.

C1.3 Building the business-as-usual scenario

For effects relating to "*fuel efficiency*" we have applied relative *reduction factors* to fuel consumption and emissions in 2005. Thus, we have avoided the necessity to establish a business-as-usual scenario for 2008. There is reason to assume that the business' production (vehicle kilometres) has increased since 2005 for external reasons. In that case, the absolute effect of the measure is *underestimated* in our evaluation (based on 2005 consumption). Anyway, there is no reason to assume *overestimation*, since there has been a strong economic growth during the period of implementation of this measure, implying increased demand for transport services.

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport.

C2.1 Economy

The economic consequences of the measure are:

1. *Costs.* Costs are related to the process of selecting, testing and evaluating suppliers, as well as installing vehicle computers in seven vehicles. These costs amount to 200 000 Euros, including salaries, durable equipment, consumables, travelling costs.

2. *Benefits*. Benefits are not obtainable during the implementation of this measure, since the scope has been reduced and scaled down. Despite this, it is important to point out that, when the vehicle computers are installed in full scale, it will most probably result in economic benefits from both optimized route planning and reduced levels of fuel consumption, as further described in C4, *Up-scaling of results*.

C2.2 Energy

The effects on energy will occur through two different processes:

1. *Improved Heavy Eco-Driving behaviour*
2. *More efficient transport planning*

At current, the effects from both 1 and 2 are very small, for the reason that this measure has been implemented in small scale, as an equipment development project.

The long term effect of the first one, *Improved Heavy Eco-Driving behaviour*, can be estimated from previous experiences and studies in the field, that have shown that feedback systems can have significant impacts of on the ability to maintain reduced fuel consumption levels after training eco-driving.[1] For application across the whole Malmo LBC fleet this would equate to around 115,000 litres of diesel per year.

The benefits of the second type, *More efficient transport planning*, will have to wait until the equipment is adequately developed and full scale implementation has occurred before they can be estimated.

C2.3 Environment

Significant effects on the environment could not be registered during the implementation of this measure, since it was a small scale project. However, significant effects are expected as soon as the vehicle computer is installed in full scale. Expected effects are mainly reductions of emissions of the greenhouse gas CO_2, as a result of reduced fuel consumption.

Based on results from previous studies[2], we have estimated the extra effect from improved feed-back to be an additional 2 percent reduction of fuel consumption for trained drivers. This fuel reduction effect would correspond to Malmö LBC saving the environment from emissions of another 300 tonnes CO_2 (under the presumption that first all LBC drivers were to attend Heavy Eco-Driving classes).

C2.4 Transport

In the end the vehicle computer was installed as a technology development project in small scale, seven lorries, which is not enough to optimise the transport system. For this reason it is not possible to report any effects on the transport parameter.

C2.5 Society

Most probably the measure has had positive effects on the drivers, especially those that are testing the vehicle computers, in terms of being involved in the development of the data technique and therefore also being heard for their needs and requirements

[1] Vägverket (2004). *Klimatstrategi för vägtransportsektorn*, Publ 2004:102
[2] Vägverket. (1999) *Effekter av EcoDriving på avgasutsläpp och bränsleförbrukning, en förstudie.* Publ. 199:165; and Johansson H. et.al. (2003) *Impact of EcoDriving on emissions* presented on the 12th International Symposium "Transport and Air Pollution", Avignon 16-18 June 2003, page 73

when it comes to their day to day work situation. There is also reason to believe that this will, in turn, also give positive effects on the development of the business.

C3 Achievement of quantifiable targets

No.	Target	Rating
1	Reduced number of un-loaded journeys in Malmö by 2.31M km/year	NA
2	Decreased emissions of the greenhouse gas CO_2	NA

NA = Not Assessed 0 = Not achieved
★ = Substantially achieved (> 50%)
★★= Achieved in full ★★★= Exceeded

C4 Up-scaling of results

Even though Malmö LBC has already achieved an unusually high level of long term effect of the Heavy Eco-Driving Education (measure *11.9, Heavy Eco-Driving),* there is reason to believe that the full scale implementation of a company designed vehicle computer would contribute to even further reductions of fuel. The reason for this assumption is that the drivers would be even more careful and drive even more economically as they get a direct feedback on their driving performance and the consequences on fuel consumption and emissions, hence their direct personal environmental impact. A prerequisite being, of course, that the drivers are first trained in Heavy Eco-Driving.

On a national level, given that all drivers were trained, and had the same feed-back and incentive conditions as the Malmö LBC, CO_2 emissions would decrease another 113,000 tonnes. For the City of Malmö, the corresponding result would be reductions of 1,100 tonnes CO_2.

C5 Appraisal of evaluation approach

Since the measure has, during the course of the project, been redefined to a technology development study, it is neither meaningful nor possible to conduct an evaluation of the environmental effects that have occurred during the project. Instead, the only relevant analysis at this stage is prediction of up-scaled effects, as presented in C4*, Upscaling of effects.*

However, the estimation of up-scaled results is subject to profound inherent uncertainty for different reasons:

(1) There is no data, neither from Malmö LBC nor from other studies, on how monitoring and real-time feed-back affects Eco-driving behaviour when there is already an ambitious feed-back and incentive system in place (which is the case at Malmö LBC). *We have assumed a reduction of additional 2 percent relating to feed-back to Eco-drivers based on previous studies.*

(2) The *potential* for improvement in route and transport planning will depend on several business specific factors, such as current level of coordination, geographical distribution of pick-up and delivery points, time constraints for pick-up and delivery etc. Because the technology is still being developed, there is currently no data available for Malmö LBC from which these factors can be assessed.

(3) It is yet unclear into which kind of optimisation process (computer-based or manual? real-time or strategic? etc) the data from the vehicle computers will be fed

with the aim to achieve higher efficiency. The extent to which the potential for improvement (2) will be realised depends on all these factors.

We have concluded that *the effect with respect to improved route and transport planning can not be estimated* before the system of vehicle computers is fully installed. Further, it will be difficult to make the estimation after installation, since baseline data is not available.

C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** – Vehicle computers have the potential to *enforce the effects of Heavy Eco-Driving education* on reduced fuel consumption and emissions of the greenhouse gas CO_2.
- **Key result 2 –** The extent to which installation of vehicle computers at Malmö LBC can contribute to environmental benefits relating *to more efficient route and transport planning cannot be assessed* at the current early stage of development.

D Lessons learned

As it turned out, installing vehicle/driver support that would match the needs of Malmö LBC was a process that needed quite a high level of innovation and the implementation of this measure has been influenced by a number of internal and external factors.

In our analysis, aiming to identify the drivers and barriers of the implementation process, as well as recommendations for the future, we have chosen to apply the following structure for the influential factors:

- *Technical factors*, referring to the performance and functionality of the technical systems and programs, as well as the need for innovation. There is reason to explore this point, since implementation of new technique requires investments in time, money and the users trust in technical changes.
- *Economic factors*, in terms of costs, investments and expected benefits related to the project, as well as the source of finance. Solving these economic factors is key to the success of the measure, since economy is the most important driver for the business.
- *Organizational factors*, within which group we identify the following sub-groups.
    - *Decision-making*: refers to how decisions are made in the organisation, whether there is a top down approach or if it encourages participation.
    - *Communication*: refers to the communication works within the organisation, on each level and in-between levels, as well as external communication with stakeholders.
    - *Attitudes*: refers to the attitudes towards innovation, change and in general to the context to which people belong, as employees, vehicle owners and drivers.
    - *Competences and skills*: refers to the degree of knowledge and skills in the organisation to handle the project.

Organisational factors are important because of their influence on the propensity to develop innovations, according to research in the field of innovation and organisational change[3] (see below).

- Dependence on external stakeholders, focusing on the strategically most important ones, meaning those that influence directly on the result of the project.

In the following, these factors are described and explored, using data from interviews with the following Managers and vehicle-owners at Malmö LBC:

Peter Willborg, Manager of Quality and Environment, and in charge of the SMILE-measures

Magnus Larsson, Manager of the Business Area Crane and Construction, and project Manager of the vehicle computer installation since January 2008.

Peter Olsson, vehicle-owner and driver with one employee, member of the board

Rickard Olsson, vehicle-owner and driver.

Technical factors

The technical functions that Malmö LBC required from the vehicle computers are:

- Positioning, so that the traffic coordinator has a real time control over the vehicles position. This enables more efficient route planning and has the potential to reduce unloaded kilometres driven.
- Order distribution from the traffic coordinator and registration of activities on part of the driver.
- Measure fuel consumption and eco-driving performance

According to both drivers and managers, the vehicle computers installed in seven lorries have serious limitations. The system is not reliable and the program is not user-friendly, which is time consuming for the drivers. Among various complaints are that the screen is too small, the system is too complicated, for example it is very complicated for drivers to register new orders, the GPS turns off and has to be switched on several times a day.

In order to succeed with the installation and get acceptance from the drivers, a more user-friendly software would be required, which would be adapted to the drivers day to day routines and easy to handle for a person that is not used to computers. It would also have the right screen size.

The alternative supplier of vehicle computers, Vehco, has a more user-friendly system, according to Magnus Larsson. But the Locus TDX-mobile was chosen in order to make sure that the application would fit with the mother system at Malmö LBC, which is based on Locus.

Economic factors

The budget from the Civitas SMILE measure has financed part of the screening and testing process of Malmö LBC, which has given them the possibility to initiate the process and get to this point. Further, the computer has the potential to save money for Malmö LBC, hence for the vehicle-owners. But the financing of the vehicle computers as such is still an unsolved issue. Should it be on the part of the vehicle owners individually or on the part of the company? In the latter case, all vehicle

[3] Kanter, R M. (1983). *The change masters. Innovation and entrepreneurship in the American corporation.* New York: Simon & Schuster; as referenced in Frode Bakka, J. et al (1993). *Organisationsteori : Struktur – kultur – processer.* Liber-Hermods.

owners would have to install it. In general, they are a bit sceptical to these kind of joint investments.

Organisational factors

The interviewed managers and vehicle-owners are basically very positive towards the introduction of vehicle computers. They believe that the vehicle computer has a great potential and that it is part of a necessary development for Malmö LBC. The expected benefits of the vehicle computer mentioned by the interviewees can be summarised as "efficiency gains" such as:

- Increased efficiency in administration and distribution of orders, as well as follow-up in terms of timelier invoicing. This leads to better quality of the deliverance and reduced administrative costs.
- Optimised route planning, hence more efficient use of the drivers and reduced costs for unloaded kilometres.

The support for eco-driving performance and data on environmental impacts is not considered the major benefit for the vehicle-owners; it can be seen as an important concern from the Managers side. Nevertheless, there is an environmental concern in the company. Drivers try to drive more fuel efficient, as a result of the training in Heavy Eco-Driving (Civitas SMILE measure 11.9). However, they experience that it is difficult to follow the Heavy Eco-Driving recommendations, due to time-constraints. Updated data on fuel consumption and environmental performance would be useful feedback to the drivers and make them more concerned with their driving behaviour, according to one driver. He also mentions that a follow up on the course after six months would be necessary in order to maintain skills and motivation. In the meantime, another driver was not interested in getting this kind of information and did not see that he could influence fuel consumption or emissions very much, despite the fact that he had also attended the Heavy Eco-Driving course.

Even though the environmental impacts are not the focus for the drivers and vehicle-owners, this measure has the potential to have a positive side-effect on emissions of the green house gas CO2, thanks to reduced unloaded kilometres.

However, this effect is not to be expected with the current system, since it has serious limitations, according to both drivers and Managers. The test group has discussed the technical problems, mentioned above, on the test-group meetings, but most of them have not been solved. The reason for this is, according to them, the insufficient capacity of the supplier, which has slowed down and delayed the process. According to Magnus Larsson, there has also been some lack of communication and management from the side of Malmö LBC. But, he had expected that the supplier would drive the process and development of the technical solutions. What the supplier thinks about this and what is agreed upon on this point has not been explored.

The other drivers are also positive to the vehicle computer, according to the interviewed vehicle-owners. Their major concerns are the user-friendliness and the cost of installation. Certain scepticism among divers might stem from earlier experiences of failure, when installing a mobile in all vehicles that never worked as expected.

In organisations with a cooperative culture, problems are seen in a bigger context and solved by common efforts, and there is focus on interchange of ideas and information according to research[4]. Such "integrative" organisations have a greater

[4] Kanter, R M. (1983). *The change masters. Innovation and entrepreneurship in the American corporation.* New York: Simon & Schuster; as referenced in Frode Bakka, J. et al (1993). *Organisationsteori : Struktur – kultur – processer.* Liber-Hermods.

potential to develop innovations than the "segmentalist" organisations[5]. In the integrative organisations there are often unclear job-descriptions, overlapping functions and responsibilities, unclear authority as well as resources, and people are expected to collaborate rather than work individually. But, evidently, all this uncertainty leaves a gap for innovation to flourish – it tends to encourage people to take part in decisions, take on responsibility and take own action.

In general, Malmö LBCs is a company where cooperation and concern seem to be rooted values, and with a flat structure and short decision ways that matches with the type of "integrative" organisations that tend to be more inclined to develop innovations. There are many different signs of this. Cooperative values stem from the fact that the drivers are part of the organisation that owns the company, Malmö LBC AB. The vehicle-owners interviewed seem to have a strong "we" feeling and they see themselves as part of a bigger context, which they consider positive. "If Malmö LBC wins, I win", as one driver expressed. The test-drivers consider that the Managers listen to their opinions and that they can influence on decisions. They seem confident with that their voice will count and that decisions will be made in consensus.

Other signs of this concern are that drivers inform their colleagues if there is a job nearby them. This optimises transports and reduces costs for the organisation. Other examples of the positive corporate culture are that new drivers get assigned a godfather during the first six months. Though, according to one driver, the team spirit has decreased during the past years. Today everything is made up on the phone; before they used to meet frequently in order to plan and make up the next days work.

Dependence on external stakeholders

As mentioned above, the supplier of the vehicle computer is the most strategic stakeholder in this process. Unfortunately, their lack of capacity has limited the development and implementation process. Due to problems with the personnel, they have not been able to deliver in time and the process has been delayed. There has been a lack of engagement and drive in the whole process, from their side, as the Malmö LBC experiences the situation.

Another type of strategic stakeholders is the vehicle-owners. They are, as mentioned above, indirect owners of the company. Their attitude towards installing new technique in general, and the vehicle computer in this specific case, is decisive for the success of the project. They are in general sceptics to installing new technique (based on previous experiences, as already mentioned), to the financing issue and to whether it will function as wanted. Though, if these issues would be solved, they are positive to the installation of vehicle computers.

D1 Barriers and drivers

From the analysis above, we identify those central barriers and drivers of the implementation process that are presented and discussed in D1.1 Barriers and D1.2 Drivers below.

[5] "Segmentalist" organisations tend to keep things separated and solve problems by splitting them up, not considering them as part of a bigger context. The structure is more hierarchic, with many departments that live their own lives independently of each other. Innovations in such organisations are implemented with a top down approach.

D1.1 Barriers

- **Technical system and supplier is not satisfactory** – After screening and testing the vehicle computers, it was found that they could not deliver satisfactory data on route planning and emissions, the GPS-system is unstable, the program is not user-friendly and the size of the hardware is not optimal, the screen is too small. For Malmö LBC it would not be resource efficient to invest in such technique.
- **Undefined roles -** The financing of the vehicle computers is an unsolved issue, whether it should be on part of the individual vehicle-owners or on part of the holding. The roles of Malmö LBC and the supplier, Locus, are not clear and there are expectations that have not been fulfilled. The customer expects the supplier to take a lead and responsibility to drive the process forward.
- **Pending attitudes of drivers -** From previous bad experiences there is a certain scepticism towards joint technical investments. Vehicle-owners are coloured by this experience and before taking a risk they would want to secure economic benefits.
- **Efforts to over-meet expectations may paralyze the process -** It is of major concern that the above failure is not repeated, which is very good, but might lead to a tendency to look for something so perfect that it is difficult to realise.
- **Miscommunication of goals and benefits** – Goals and benefits have not been hundred percent agreed upon from the beginning. Getting the drivers to see the benefits has been difficult, due to that drivers are a bit reserved and concerned with financial issues and previous bad experience, as mentioned above, and because there has not been a sufficiently good computer to present to the drivers, that fits the expectations and needs of both drivers and Managers. Also there seem to have been a certain mismatch between the Manager's focus on Eco-Driving monitoring, and the drivers' focus on route and transport planning effects.
- **Suppliers lack of capacity –** The supplier that was selected did not have the capacity to deliver on time nor to develop solutions to the technical problems that Malmö LBC pointed out. This was due to personnel problems at the company.

D1.2 Drivers

- **Vision** – There is a positive attitude towards the vehicle/driver support, on behalf of the Managers and the test-group. They have a strong and clear vision that this is the future, something they have to do, and that it would bring great benefits to the company, if only the technique and hard-ware would be adapted and flexible to their needs.
- **Potential to increase efficiency and reduce costs** – The vehicle/driver support has the potential to increase efficiency in administration and distribution of orders, as well as follow-up in terms of more timely invoicing. This leads to better quality of the deliverance and reduced administrative costs. It also has potential to optimise route planning, hence more efficient use of the drivers and reduced costs of unloaded kilometres.
- **Organisational potential for innovation** – Malmö LBC has got the type of organisational structure and corporate culture that is more inclined to take on and develop innovations: cooperation and concern prevails, short decisions paths and open communication.

D2 Participation of stakeholders

- **Suppliers of vehicle computers –** Locus and Vehco have been involved in the process of testing and evaluating the vehicle computers. Locus has become a strategically important stakeholder, since Malmö LBC decided to test their computers, the TDX mobile, in seven lorries. In September 2008, Locus and Malmö LBC signed a collaboration agreement to develop a vehicle computer that suits the needs of the transport company.
- **Vehicle-owners –** this group is another strategically important stakeholder, they are members and indirect owners of the company Malmö LBC AB. They have to be convinced about the use, benefits and functionality of the measure, as further explored above.
- **The collaboration partner Akka Frakt** – the collaboration partner was involved in the first test round of the two computer suppliers.
- **City of Malmö** – thanks to this measure, Malmö LBC has the potential to contribute to the reduction targets of CO2 of the City of Malmö.

D3 Recommendations

- **Relevant, measurable and formalised goals –** The goals should be relevant to the expectations of the whole organisation, and especially to the vehicle-owners. In other words, the goals should reflect those efficiency gains that the organisation expects from the vehicle computers: mainly reduced administrative costs and reduced unloaded kilometers. These goals should be made measurable and formalised from the very beginning of the process. If the target can not be measured today, there should be a plan for how it can be handled and monitored further on, as mentioned under the next bullet.
- **Plan for follow-up on performance –** There is a critical need to show the results of the measure, in order not to loose the vehicle-owners confidence in the system. For example, baseline data unloaded kilometers is lacking today, hence there is a need to figure out how to make follow-up on this variable.
- **Actionplan for reaching goals –** To elaborate an action plan that describes how goals and results are to be materialised, what actions are to be taken and when.
- **Definition of roles and responsibilities -** The roles and responsibilities should be clearly defined, in terms of who will finance the vehicle computers, as well as the role and responsibility of the supplier versus the customer, in driving the innovation process.
- **Clear communication** - There is a need for a very clear communication of all the above, from the side of the Malmö LBC. It is needed to make clear to vehicle-owners that there will be no top down implementation or investment in any technique that would not be beneficent for them as a whole.
- **Education -** A training program for all drivers, as well as administrative staff, should be run as soon as the vehicle computers are installed to avoid distrust and frustration which might jeopardise their acceptance altogether.
- **Eco driving –** It is recommended to encourage drivers who have participated at the heavy eco driving training programme to continue to practice the learned technique whilst this measure is being implemented which will yield environmental benefits in terms of reduction in vehicle emissions. Also, it is worth encouraging trained drivers to attend refresher sessions to maintain and expand the knowledge of eco driving and recruiting new drivers to take up the training in heavy eco driving to maximise potential environmental benefits.

D4 Future activities relating to the measure

The plan is to take decision on suitable supplier partner during the first quarter of 2009. A second screening of suppliers is already being done. Malmö LBC wants to find a supplier that will also be more of a collaboration partner, with a solid organisation and economy, and that is engaged in the development of the latest technology in the area.

The goal of Malmö LBC is to have 50 vehicle computers installed by the last quarter of next year.