Measure title: **Marketing for alternative fuels in the public and private sector**

City: **Suceava** *Project:* **SMILE** *Measure number:* **5.7**

A Introduction

The percentage of existing LPG vehicles (buses, taxis, vans, minibuses, vans) in Suceava is low (approximately 4-7% in 2004). Diesel-driven vehicles are still the most used vehicles for goods distribution, private companies and public transport in the residential and commercial area. Harmful emissions contribute to the greenhouse effect and generate traffic related noise and pollution.

The City of Suceava plans to produce purified biogas from the fermentation of sludge at a local sewage treatment plant. Facilities for biogas fuelling do not exist at the present time and vehicles using biogas are experimental so there is not a local or national market for these types of vehicles. There are currently 6 LPG refueling facilities in Suceava in 2005 and it is expected that another 3 will be built by the end of 2006.

Pollution (especially from traffic emissions) and its impact on the greenhouse effect has become one of the major environmental problems for cities like Suceava. Also the accession process to the European Union obliges the national and local authorities to undertake measures to reduce the greenhouse effect and improve local air quality.

At the moment electric and hybrid vehicles are expensive so Suceava Municipality is trying to initiate some measures that promote lower costs and have a big impact relative to the investments costs. One major objective is therefore to increase the number of vehicles using clean and renewable fuels, thus reducing the use of diesel and leading the way to a more sustainable transport system.

Between September 2002 and September 2005, Suceava Municipality was a partner with local authorities and local transport companies from United Kingdom and Italy in an European Union project called **"CATCH – Clean Accessible Transport for Community Health"**.

The project's main objective was to implement measures that determine reduction of traffic and public transport pollution and the implemented measures were:

- 10 minibuses and 4 Municipality cars retrofitted with particulate filters
- 2 LPG cars purchased in order to promote environmentally friendly vehicles
- Cycling and Walking measures and an integrated circulation and parking plan for city centre talking into account the LEZ established during AlterEco Project
- Heavy traffic was diverted away from the city centre
- Information about environmental impacts of transport were made available to the public to increase awareness

Therefore, in 2002 Suceava Municipality began marketing activities for LPG vehicles as part of the CATCH Project, by demonstrating the feasibility of implementing LPG facilities to a Euro 4 vehicle. After 3 years the next step is to encourage PT operators and the private sector to increase the impact of alternative fuels in the city of Suceava.

A1 Objectives

The measure objectives are:

- **Objective 1:** To reduce emissions from general traffic and PT
- **Objective 2:** To improve the quality of life in the city
- **Objective 3:** To create favorable conditions for development of a local and national market for alternative fuels
- **Objective 4:** To improve PT conditions
- **Objective 5:** To develop the local facilities for biogas fuelling and support the development of a local market for this type of vehicles

A2 Description

The main reason for implementing this measure is to reduce the environmental impact of traffic and PT by using less polluting vehicles and by replacing the existing traditional fuels with alternative and less polluting fuels.

For a real impact and a significant reduction of traffic emissions, the number of clean vehicles should be extended not only in the public sector but especially in the private sector and PT. As the economic situation in cities from accession countries is still unstable, measures like the utilisation of alternative fuels is much more feasible and it is expected to better reach the goals than other measures (electric or hybrid vehicles).

The promotion of alternative fuels was performed in two stages:

a) To encourage the private owners to equip their vehicles with LPG converting systems
b) At the same time to develop the alternative vehicle fuel market – private owners were encouraged to purchase new environmentally friendly vehicles

The marketing campaigns for LPG conversion systems, alternative fuels and alternative vehicles were focused initially on central and adjacent residential areas where agglomeration of population and vehicles gave rise to higher levels of pollution and noise. As the city was to expand rapidly due to the economic and social development, the areas tackled multiplied and more citizens were reached by the campaigns. In the same period, the garages licensed for installing LPG converting systems were tackled in order to make them aware of the project actions and prepare them for any demand increase as estimated. In this respect, measure 5.6 offered an example of good practice to all the public transport operators.
Besides that, the development of local and national markets for alternative fuels was aimed at filling stations, to improve the spatial dispersion and to increase LPG sales.
Car dealers were informed with regard to the necessity of promoting LPG cars and clean vehicles to reduce the traffic emissions, for protecting the negative impact on the environment caused by the increased use and ownership of motorised traffic within the city. It is expected that by proving the feasibility, viability and cost effectiveness of LPG use in both private and public transport, the number of alternative vehicles will be increased, decreasing the use of regular fuels.

All the campaigns involve the partnership forming the Vehicle Related Emissions Monitoring Group, between Suceava municipality, Suceava City Council, LTC, Environmental Protection Agency and the Heath Authority.

Once proved that implementation of alternative vehicles is feasible and more environmentally friendly (using vehicles owned by the local transport company) Suceava Municipality is to extend the measure to a larger scale in the city (i.e. private transport companies, vans for goods distribution, taxis etc).

This creates the conditions for having a local and national market for clean vehicles.
Also it is expected that at the end of 2008 the number of alternative vehicles will increase both in the private and public sectors.
The desired effects could be quantified as:
• 3 % reduction in greenhouse gas emission from LPG taxis
• 2% reduction in greenhouse gas emission from LPG minibus owned by private Transport Companies
• 6% reduction in greenhouse gas emission from increasing (by 25%) of the number of private cars which are operated with LPG fuel.

Concurrent with their own effort to implement a cleaner public transport system within Measure 5.6, by implementing Measure 5.7, Suceava Municipality took initiatives to:

- Support the marketing of alternative fuel vehicles, for private companies that provide public transport
- Develop local and national markets for alternative fuels vehicles in the coming 4 years: 2004-2008
- Develop local facilities for LPG fuelling and support the development of local markets for these types of vehicles

The main activity has been related to promotional campaigns for alternative fuels on both the local and national level.

B Measure implementation

B1 Innovative aspects

Innovative Aspects:
- Use of new technology
- Targeting specific user groups

The innovative aspects of the measure are:

- **Use of new technology, nationally** The use of alternative fuel technology in vehicles in Romania is not sufficiently developed. The measures will build on the introduction of new alternatively fuelled public transport vehicles to promote alternative fuels in a wider segment of the vehicle market.
- **Targeting specific user groups, locally** This action will build upon the actions of the municipal bus company to target privately owned bus operators and then other fleet operators such as freight operators and taxis.

B2 Situation before CIVITAS

The percentage of existing LPG vehicles (buses, taxis, vans, minibuses, vans) in Suceava was very low (approximately 4-7% in 2004). Diesel-powered vehicles were still the most common vehicles for goods distribution, used by private companies and public transport in the residential and commercial area. Biogas is not available on the market; therefore the alternative fuel vehicles market is not developed and not attractive for potential car purchasers. Both concepts were hardly known and the benefits never coherently presented and explained to the public.

In the PT bus fleet, (all pre-Euro diesel vehicles), there was one old bus which was retrofitted with a particulate trap (a FPT system), as an interim measure before the engines were replaced by LPG or other alternative fuel powered engines. This is an almost insignificant step in adopting practical technology to mitigate emissions from the existing vehicle fleet and in trying to draw citizens' attention to the necessity of protecting the environment.
In 2004, there were 11 petrol stations, only three were selling LPG throughout the year, and another one was distributing this fuel only in the summer.

There is little in the way for promotional work in this area as the technical solutions/market opportunities have not been well known or available, or have been too expensive.

B3 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Organising the implementation team and assigning the tasks to be accomplished by each member, at each level – decision makers and executive staff; issuing the communication strategy for local media, citizens, car owners, and private transport operators, all relevant categories to the specific measure and to the project.

The measure implementation team included people from both decisional and executive levels. The organisation chart established hierarchies and tasks for each member apart, correlated with their authorities and implication in the internal activity of the City Hall.

Mr. Ion Lungu, the mayor from 2004-2008 and re-elected for 2008-2012, communicated with the local media, all stakeholders, citizens and private businesses and had the authority to co-approve the expenses made for the project and also to take decisions with regard to the actions during the project lifetime. He was part of the major Procurement Committees that were in charge of the designation of the main Contractors to deliver the services demanded.

Mr. Dan Dura, the head of the European Integration and Development Strategies Office, as site manager, had three main duties. The first was the procurement of the Feasibility Study. The second was collaboration with the Contractor to identify the main ways to create a boost for the LPG and alternative fuels market. The third was the supervision of all activities, both in terms of organisation and implementation. This latter role included: Coordinating the market analysis of existing market for LPG and biogas vehicles; Organising consultation and negotiations with private companies involved in PT (taxi companies and freight carriers); Training activities for taxi, minibus drivers and for private citizens; Working together with the subcontractor and with the representatives from EPA in the evaluation process; Organising and sustaining lobby activities tackling the political sector to push voting for different taxation levels for alternative fuelled cars; and ensuring bonds between all measure team members.
Mrs. Angela Zarojanu (vice-mayor from 2004-2008 and her replacement Mr. Viorel Seredenciuc for the mandate 2008-2012) had important tasks with regard to reaching out to the political sector for promoting provisions to offering facilities to the alternative car owners and legal measures for tax decreases for the alternative fuel taxi owners.
Mrs. Elisabeta Vaideanu, the Executive Manager of the City Hall responsible for the planning of the expenditure and with the payments co-approval, had tasks related to extending the alternative fuel facilities throughout the city, along with being part of consultation with citizens for the measure implementation.
Mr. Mihail Jitariuc, the head of the Urban Planning Direction, was directly involved in cooperating with the vehicle fuel suppliers, with LPG supplier stations, and in working to identify potential new suppliers and facilities for alternative fuels.
Mrs. Geta Prisaca, councillor within the European Integration and Development Strategies Office, was assigned tasks regarding the organisation of all tenders, the assessment of the received offers and she was actively involved within the dissemination and marketing campaigns.

Ms. Magda Sniatowschi (2005) and later Ms. Narciza Nenec (from 2006-2009) were responsible for the dissemination activities in Suceava, tasked with organising the marketing and promotion activities, issuing dissemination materials, and publishing online news.
Ms. Narciza Nenec became the local evaluation manager from 2006 on and was responsible for all activities implied by the evaluation processes and the reporting templates.

Date: February– March 2005

Stage 2: Procurement of the Feasibility Study to design the SMILE measures implementation

2.1 Organising the tendering procedure for designating the contractor

The organisation of the tendering procedure began with market research designed to identify consultancy companies with expertise in this field. The implementation team got involved in consultations about topics related to the situation of road traffic, the state of pollution and quality of life in Suceava. The Feasibility Study proposes measures for improvement of public transport, designs promotion campaigns for measures related to decreasing the traffic levels and pollutants emissions caused by it.

The procurement procedure was organised according to the legal provisions and the contract was concluded.

Date: April 2005 – July 2005

2.2 Receipt of the Feasibility Study

The contract resulted in a Feasibility Study deliverable.

This deliverable ascertained activities for marketing of alternative fuel, for selection of new alternative vehicles and for improvement of public transport and general traffic. This study informed further decisions with regard to road traffic regulations, closure of some roads, transforming roads into one-way routes and giving a higher importance to PT buses.

Based on these findings, the SMILE measures have been designed.

Date: March 2006

Stage 3: Organising marketing campaigns for alternative fuels and clean vehicles

Initially, the marketing campaigns particularly targeted vehicles used in densely populated areas, the most effected by pollution and noise. They, mainly, have been made aware of the risks of pollution caused by the regular fossil-made fuels.

Another focus was set on the filling stations, the main interface between producers and purchasers. Related to this link in the chain, the project team tackled the topics of LPG and biogas separately.

The objective was to demonstrate LPG's feasibility as a clean/ecological fuel, as well as to propose to them that they maintain and extend the offer, keep a record of sales and trend of demand and to support us in collecting the data necessary for the SMILE measure evaluation progress.

The campaigns purpose was not only to increase LPG sales at the existing re-filling stations, but also to extend the number of filling stations offering LPG, and so expand the offer spatially. Future LPG demand was quantified based on technical documentation related to LPG unit consumption and the forecast increase in ownership of alternative cars. These figures made the tasks implied by the campaigns deployment easier and supported them with a technical study.

To no less extent, taxi companies and minibuses were targeted. For them, the price of fuel is decisive in their business. In addition, the technical functioning of their cars is an important factor when making this decision. The marketing campaigns included economic studies showing the costs with fuel reduction (bearing in mind the LPG unit price/litre is 50% of the

diesel/gasoline unit price) and the other benefits in terms of engine long-life and noise level.

To complete the picture of all actors playing a role in this market, the garages authorised to install the LPG conversion systems were targetted. The marketing campaigns had to figure out their technical and dimensional capacity to respond to the forecast demand for LPG converting systems installation. LPG converting systems producers were tackled at the right moment, when inviting them to take part in the public procurement process carried out for the procurement of the Local Transport Company (LTC) new IRISBUS-IVECO bus LPG converting system.

Having collected all of the information, the next level to tackle was the car dealers market and their offer regarding LPG cars and potential alternative fuel cars in the future. From both sides, the project team and the car dealers' representatives, information was exchanged and the transfer of knowledge made possible to better plan ahead for the development of the market.

All the campaigns have been developed and carried out within a close partnership between Suceava municipality, Suceava City Council, Local Transport Company, Environmental Protection Agency and the Health Authority, forming the Vehicle Related Emissions Monitoring Group.

Date: July 2005; May 2006; September 2006; May 2007; September 2007; May 2008.

Stage 4: Organising promotion campaigns for alternative fuels and clean vehicles

Promotion campaigns targeted the private and public transport sectors. The main focus was on the private taxis sector that received special attention in order to raise their awareness and acceptance of the LPG fuel and LPG converting systems.

Extending the area of applicability for measure 5.6, namely PT bus fleet (100% clean vehicles) and minibus fleet (20% clean vehicles), measure 5.7 aims at extending the area coverage of the same initiative at the level of private transport vehicles (taxis and minibuses) and to give an impetus to the alternative fuels and vehicles market. In this respect, the results obtained in PT have been the corner stone of the promotion campaigns. Based on what happened within the PT bus fleet when procuring the 14 LPG converted buses from the initial supplier and purchasing one LPG converting system ourselves for one new bus, after a public procedure, we could use the results for the current promotion campaigns.

The taxi sector was tackled by focussing on two aspects: to persuade the owners to convert their cars to LPG fuelling and to replace the old Euro 0 and Euro 1 cars with modern cars with Euro 3 and 4 engines; and to opt for the alternative fuelled vehicles when deciding to renew their fleet.

The campaigns resulted, to an extent, in a shift from regular fuelled vehicles to LPG fuelled vehicles, caused by the increased reliability of LPG fuel but also due to the reduced unit price, in the conditions of soaring world oil prices.

The criss-cross analysis of the marketing campaigns results have been centralised and they provided good economic and technical information, which stood as a base for the design of promotion campaigns targeted at private transport performed with taxis.

With regard to the private public transport, the team assumed responsibility to having part of the minibus fleet converted to LPG use. As in the case described above, the information has been supplied to the owners, in order to make them aware and raise their interest for cleaner vehicles, at least considering the economic effect that is attractive to them, and motivate them to convert their vehicles to LPG, if not renewing their fleet with new cars fuelled with LPG.

In the future, if such initiatives prove successful and demonstrate that alternative fuel and cars are feasible, the foundation for the alternative cars market is laid. Its development is tightly connected to the possibility of adjusting the fuelling systems demand at the fuel type offer.

For the course of the current project, we organised campaigns for biogas fuel as being available in the future, from 2010 on, in order to raise citizens' awareness for the benefits of this fuel. At this moment, biogas fuel is not locally available and the local and national vehicle markets do not offer opportunities to procure such cars.
LPG fuel is currently well regarded and the LPG promotion campaigns gave good results. LPG is available on the local market and represents an intermediary phase towards biogas fuel.
Promotion campaigns were hosted whilst the car dealers were organising car presentation shows in the city centre.

Date: August 2005; July 2006; November 2006; July 2007; November 2007; July 2008

Stage 5: Monitoring the LPG fuel and vehicles market and promotion campaigns designed for the political sector – in order to get support for elaboration of a local regulation for alternative fuel vehicles.

This 4 year term (2004-2008) has been critical for the city's transformation. Many changes occurred that necessitated the citizens' understanding and acceptance. All such changes were made or planned to be made according to thorough studies performed by consultancy companies. The city traffic study, the Feasibility Study for esplanade rehabilitation and architectural modernisation of the House of Culture, located in the Low Emission Zone and historical part of the city, the Zone Urban Plan for the city centre, other studies for the planned modernisation of all economic and social environments asked for active involvement and participation from all citizens.

At the same time, an important emphasis was put on road traffic modernisation and keeping it under control, measures well integrated with the environmental protection care. Consultations at the political level for devising legal provisions to reduce taxes for alternative fuel vehicles gave partial results. They show now a positive attitude to using the fiscal charges differentiated for different fuels car categories (as a fiscal relaxation for the clean car owners and a heavier charge for those whose cars are responsible more for the road traffic emissions spread in the air).

With regard to political support for different taxation rules for clean vehicles and regular vehicles, 2008 is an electoral year and we had local elections on 1st of June, in consequence we dealt with an unpopular measure so far, and that will be raised again for discussion in the forthcoming period.

Date: February 2006 - July 2006; November 2006; July 2007; November 2007; July 2008 – till the project completion

Stage 6: Training for SMILE team member regarding biogas fuel – an international seminar was organised in Bucharest by ENERO (Centrul pentru promovarea energiei curate si eficiente in Romania – The Centre for Clean and Efficient Energy Promotion in Romania). Attendees from European innovation centres, university and research institutes, alternative fuel producers, sellers on the Romanian market, transport operators and local and central public administrations invitees met in Bucharest and made presentations, delivered knowledge and transferred good practice to the audience.

Suceava was represented by a project member who was on the agenda to make a presentation of the CIVITAS SMILE project in Suceava, with relation to the alternative fuel market development and measures taken in Suceava to increase it and make it more stable amongst car owners'.
At the same time, technical material and knowledge has been acquired and used in the future activities related to Measure 5.7 implementation.

Date: July 2007

Stage 7: Wastewater Treatment Plant rehabilitation project monitoring

Part of the current measure, the biogas production, will be possible after rehabilitation of the Wastewater Treatment Plant (WWTP). The process is expected to be completed by the end of 2009, and the deadline is mid-2010. After 2010, it will be feasible to have biogas fuel on the market, at fuelling stations and promotion campaigns will be continuously deployed.

Therefore, the development of biogas facilities was the subject of an amendment to the initial contract and for the course of the current project it was agreed that we should organise campaigns for biogas fuel as being available in the future, from 2010 on, in order to raise citizens' awareness of the benefits of this fuel. At this moment, biogas fuel is not locally available and the local and national vehicle markets do not offer opportunities to procure such cars.

Date: March 2006 – till the project completion

Stage 8: Evaluation activities

The *process evaluation* was the task of all measure leaders and reports were drawn periodically, according to the GUARD data base and templates received. Having support from measure leaders and the information withdrawn from the monthly Time Sheets, the evaluation manager drew out and filled out the Access data base forms, provided by GUARD. The data base is a tool to help follow the steps taken in measures implementation.

Date: February 2006; September 2006; November 2007 – December 2007; ongoing 2008

The *impact evaluation* began with establishing the Baseline position (data was taken out from the CATCH project final reporting issued late 2005) and with estimating the Business-as-usual scenario (using the forecasting from historical data and projecting a possible future). Having this initial data, the evaluation team organised surveys and collected ex-post information, relevant to the technical analysis. With regard to the economy indicators, the analysis took into consideration the economic performance of a privately owned small car, which had the engine converted to LPG.

The society indicators - The first step was to establish the population to be sampled and the sample size. The sample size interviewed was calculated to get a +/- 5% confidence interval at 95% level of confidence. The pilot questionnaire and the staff appointed to administer the surveys received proper training, in collaboration with the local University and the professor of statistics. The methodology used involved the questionnaires being deployed for a trimester on a yearly basis as a face-to-face interview method that produced a good response rate, complete coverage and best quality data.

The pollution indicators - Emissions with reference to private vehicles were calculated using data obtained using the tailpipe measurements made in accordance with the legally demanded annual tests.

The transport indicators have been established with the input resulted from a manual counting within an important intersection.

Date: November 2005 – January 2006;

July 2006 – September 2006;

July 2007 – September 2007;

May 2008 – June 2008

Stage 9: Dissemination activities

Dissemination of all measures, initiatives, results and outcomes was a continuous process, it was evenly distributed throughout the year, every year, updating the achievements of project targets and considering the step by step progress.

Alternative fuels (LPG fuel, biogas) were tackled as an important topic and information was delivered accordingly, at workshops in schools, in consultations with citizens, within local events (to mention here auto show rooms when car dealers met citizens and the project team).

Local and national events are good occasions for gathering groups of citizens together. Such events were: New Years and Christmas parties, Romania's accession to EU structure, Suceava Days 22nd-26th of June, yearly organised Mobility Week, Europe's Day 9th of May, traditional local festivals. These events are based within the Low Emission Zone and the SMILE project is promoted within these occasions**.**

Large dissemination campaigns and consultations have been engaged with the business sector in general and with private transporters - taxi companies, in particular, with car dealers and garages authorised to install LPG converting systems, looking to get support and an attitude of acceptance for the measure's final progress.

B4 Deviations from the original plan

The deviations from the original plan comprised:

- **Deviation 1** – **The promotion of legal provisions for different car taxation, according to the fuel consumed, was deployed as planned in the project, but the expected changes not yet put into force**

Promotion campaigns reaching the political sector resulted in a change of acceptability level for elaborating measures and local legal provisions for more severe rules for taxation levels. The main issue was that the promotion campaigns did not yet deliver the expected result of enforcing the legal provisions that would impose different taxation for LPG and regular fuel consumers. After the local elections that took place in June 2008, the forthcoming 4-year mandate will be decisive to make the harsher and unpopular rules become effective.

- **Deviation 2** – **Municipal vehicle fuelled with biogas unavailable (the local production of biogas fuel is delayed till mid 2010** - Contract was amended at this article)

The implementation of Measure 5.6 as planned initially was amended, as the biogas local production within the newly rehabilitated waste water treatment plant (to be funded outside the SMILE contract) was not possible. In relation with this initiative, the proposed demo-municipal vehicle conversion to biogas was not possible. Having this support hard measure not completed, the biogas promotion campaign remained at the level of communication between project team and potential users.

At this moment, biogas fuel is not locally available and local and national vehicles market doesn't offer opportunities to purchase such cars. LPG fuel is currently well regarded and the LPG promotion campaigns gave good results. LPG is available on the local market and represents an intermediary phase towards biogas fuel.

- **Deviation 3 - Emissions assessment.** It had been hoped to conduct some form of area wide assessment of emissions from transport as part of the evaluation using appropriate emissions factors for the vehicle fleet in Suceava in combination with information collected about the overall mileage travelled. However, the lack of any form of traffic model presented a major barrier to this, and after considerable research it was decided that the data collected from a range of count points could not reliably be translated into accurate vehicle kilometre data for the city as a whole without investment in such a model – a situation that is likely to be replicated in many small – medium sized cities in the recent accession countries. Instead the emissions impacts have focused on emissions measurements taken from individual vehicles in order to understand the changes due to the upgrading of the private public transport fleet.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **Measure 5.6 -** Alternative Fuel Bus Fleet

  This measure follows on from the example set by the public authority owned bus fleet's purchase of clean vehicles.

C Evaluation – methodology and results

C1 Measurement methodology

C1.1 Impacts and Indicators

Figure 1: Table of Indicators

NO.	INDICATOR	DESCRIPTION	DATA /UNITS
1	Operating revenues	Revenues per LPG private vehicle / pkm	Euros/pkm, quantitative, derived or measurement
2	Operating costs	Costs per LPG private vehicle / pkm	Euros/pkm, quantitative, derived or measurement
3	Vehicle fuel efficiency	Fuel used per vkm, per vehicle type	MJ/vkm, quantitative, derived or measurement
5	CO emissions	CO per vkm	g/vkm, quantitative, derived
6	NOx emissions	NOx per vkm	g/vkm, quantitative, derived
7	Small particulate emissions	PM_{10} per vkm	g/vkm, quantitative, derived
8	CO_2 emissions	CO_2 per vkm	g/vkm, quantitative, derived
12	Noise perception	Perception of noise	Index, qualitative, collected, survey
13	Awareness level	Degree to which the awareness of the policies/measures has changed	Index, qualitative, collected, survey
14	Acceptance level	Attitude survey of current acceptance with the measure	Index, qualitative, collected, survey
Local indicator 1	LPG fuel sales	Litres per month sold at the fuel stations	%, quantitative, collected
Local indicator 2	Total number of taxis running on LPG fuel	Increase in total number of LPG vehicles in the taxi urban service	Index, quantitative, derived

Detailed description of the indicator methodologies:

- **Indicator 1 - Operating revenues** – this indicator is focused on the differences in total income generated by fares / month, in comparison a LPG and diesel fuelled DACIA Logan vehicle (a Romanian brand, quite often seen in the taxi driving service within the city of Suceava) and a gasoline fuelled taxi, a OPEL car with similar characteristics. The relevant measurement unit will be derived from basic data collected as: total income (Euro)/month, average occupancy rate (number of passengers by vehicle)/month and the amount of driven kilometres by vehicle/month.

The data collection is made twice a year: in the summer and winter time the gasoline powered OPEL vehicle, for the DACIA Logan vehicle powered with diesel, and the same vehicle powered with LPG and at a certain maturity of the driver with trained eco-driving skills.

- **Indicator 2 - Operating costs** – Are considered to be all the costs incurred from offering taxi services. The relevant measurement unit will be derived from basic data collected as: total costs (Euro)/month, occupancy rate (number of passengers per vehicle)/month and the amount of driven kilometres per vehicle/month.

The data collection is made twice a year: in the summer and winter time for the gasoline powered OPEL vehicle, for the DACIA Logan vehicle powered with diesel, and the same

vehicle powered with LPG and at a certain maturity of the driver with trained eco-driving skills.

For a complete picture of the economic performance of the new integrated measures, it's relevant to analyse in conjunction indicators 1 and 2.

- **Indicator 3 – Vehicle fuel efficiency –** It is appropriate to use this indicator to assess the improvements incurred with the private vehicle engine converted from diesel to LPG or from premium gasoline to LPG /different powered engines from construction. To achieve this goal, the procedure utilised is to get measurements of the average fuel consumption value over a period of time, monitor the amount put into vehicle at each refill to the limit and note the kilometres run. The fuel consumption is taken as a yearly average, 2 months summer time running conditions (August and September) and 2 months winter time running conditions (December and January). The comparable values will be calculated for the gasoline engine, for diesel engine and for the LPG fuelled engine and the consumption values collected from the taxis surveyed at the economic indicators.

Having data about number of kilometres run and the total consumption in litres per each vehicle type, registered on monthly basis enables us to calculate the indicator vehicle fuel efficiency for each vehicle and type of fuelling.

In order to calculate this indicator value for the gasoline powered engine, we collected data from the taxi service provider – OPEL car, regarding the monthly kilometres run and the total fuel consumed. For the values related to LPG fuel and diesel fuel, we collected data from the DACIA Logan owners.

- **Indicator 8 - CO_2 emissions** – carbon dioxide is the most significant greenhouse gas and results primarily from the transport sector, based on fossil energy sources and due to the exponential growth of car numbers and respectively emissions caused by road traffic. The quantification of PT emissions is relevant for the results achieved after the project measures implementation. The data is collected twice (a DACIA Logan taxi car) for the gasoline powered engine and for the LPG powered engine after it was converted, with the vehicle under little load and during acceleration period; taking form of the annual test, as required by law.

- **Indicator 9 – CO emissions** – due to the exponential growth of car numbers and respectively emissions caused by road traffic, the quantification of LPG private cars emissions is relevant for the results achieved after the project measures implementation. The data is collected twice (a DACIA Logan taxi car) for the gasoline powered engine and for the LPG powered engine after it was converted, with the vehicle under little load and during acceleration period; taking form of the annual test, as required by law.

- **Indicator 10 – NO_x emissions** – the datasets cannot be collected currently, as there is no technical equipment able to monitor this pollutant emission, in the city of Suceava. Therefore a desk modelling exercise using COPERT data has been performed.

- **Indicator 11- Small particulate matter emissions PM10 -** the datasets cannot be collected currently, as there is no technical equipment able to monitor this pollutant emission, in the city of Suceava. Therefore a desk modelling exercise using COPERT data has been performed.

- **Indicator 12 – Noise perception –** The measurement of noise level is made with reference to crowded areas, in locations where road traffic is more intense and the number of residents is large, therefore the degree of dissatisfaction is manifested by a larger number of citizens. In crowded urban agglomerations, the effect of noise is further aggravated by high concentrations of people living together, therefore the surveys for collecting the qualitative data are deployed in: the city centre, Obcini district – in the vicinity of the Suceava main entrance road from south, direction Bucharest and in Burdujeni district – in the vicinity of the exit toward the east.

Perceptions were broken down into 5 different perception bands of L_{day}: classified by five answer options, two negative, two positive and one neutral (absolutely dissatisfied, partly dissatisfied, absolutely satisfied, partly satisfied and neither satisfied nor dissatisfied - neutral). The frequency of questionnaires was once a year, within a 3 months period/year, in three crowded locations.

The target group was compounded of: inhabitants and visitors. The sample size interviewed was 380 persons, calculated to get a +/- 5% confidence interval at 95% level of confidence.

- **Indicator 13 – Awareness level –** this indicator assesses the awareness of the inhabitants and visitors of a city of new integrated measures and it is carried out by means of surveys that took the form of face-to-face interviews and in-person questionnaires. In order to assess the knowledge and the impact of the information campaigns, the data collected is processed and the results are quantified for further conclusions.

The frequency of questionnaires deployment was once a year and the result takes the form of an index of the value awareness of every surveyed person by allocating a score to each type of response, as follows: *positive* +2, *partly satisfied* +1, *partly dissatisfied* -1, *negative* -2, and then converting these percentages into a weighted value, where 0 = neutral and the degree above or below zero indicates the average satisfaction or dissatisfaction with the noise level. This approach showed us what percentage of people have been reached and to what extent they have actually gained knowledge about the new measures, and thereby, whether or not and to what degree an information campaign has been successful.

The target group referred to citizens and PT passengers; each target group was represented in the survey. The sample size interviewed was 380 persons, calculated to get a +/- 5% confidence interval at 95% level of confidence.

- **Indicator 14 – Acceptance level –** or the favourable reception / approval of the measure intends to assess satisfaction with the existence and the use of the measures. The method of data collection used was by means of surveys, using face-to-face interviews and in-person questionnaires. The frequency of the questionnaires deployment was once a year and the result took form of an index of the value satisfaction of every surveyed person and set emphasis on the measures and their results, both in terms of existence and use.

Acceptance is classified according to four answer options: i) satisfied with both existence and use, ii) satisfied with existence and unsatisfied with use, iii) unsatisfied with existence and satisfied with use, iv) dissatisfied with both existence and use. A classification as such allows intercepting the twofold dimension of satisfaction with one indicator.

Acceptance is classified according to four answer options: i) satisfied with both existence and use, ii) satisfied with existence and unsatisfied with use, iii) unsatisfied with existence and satisfied with use, iv) dissatisfied with both existence and use. A classification as such allows intercepting the twofold dimension of satisfaction with one indicator.

The target group referred to citizens classified by age, profession and PT passengers; each target group was represented in the survey. The sample size interviewed was 380 persons, calculated to get a +/- 5% confidence interval at 95% level of confidence.

The indicators 13 and 14 are analysed in conjunction, because those who are aware of a measure may not be satisfied with its use or existence.

- **Local indicator 1 – LPG fuel sales –** the value was collected as the total sales quantity, from the fuel stations on annual basis.

- **Local indicator 2 – Total number of taxis running on LPG fuel –** the initial value was imported from results centralised by the CATCH project evaluation report and the current number corresponds with the data provided by the applicants for authorisations submitted at the City Hall department in charge with verification and issuance of the activity permits.

The promotion and marketing campaigns targeted at privately owned companies that provide public transport within the city, the minibus fleet and the taxi fleet which operate transport throughout the city, including the adjacent residential areas. The majority of these indicators address the taxi fleet, as the data base with the taxi licenses is annually updated at the City hall, along with the authorisations renewal. With regard to the other main private public transport provider: the minibuses fleet, the contract establishes the number of vehicles allowed to run and the quality of transport provided. The authorisation is issued every three years per routing, but the vehicle license numbers are not registered at the City Hall; that made it difficult to make a correct analysis of the fleet composition at a certain time period.

Taking the taxi fleet as an example (along with the bus fleet in the Measure 5.6), it was expected to demonstrate the feasibility and viability of this cleaner solution for providing public transport and the good results obtained by running one such vehicle. The campaigns organised will promote these demonstration results to optimise the use of LPG clean vehicles locally and to expose the advantages resulting from this undertaking.

Comparison with the taxi implies that the majority of the improvement has been made by targeting the taxi market, which is more easily influenced by the cost savings for using LPG and which on average has a much higher annual vehicle mileage, than the wider private vehicle market.

C1.2 Establishing a baseline

Economy category indicators

Indicator 1 - Operating revenues and **Indicator 2 - Operating costs**

The baseline analysis is made for the diesel and premium gasoline fuelled vehicles, with data collected in winter 2007-2008 and summer 2008. In the table below, we included the data collected from the taxi operators.

Figure 2: Data necessary for economic performance analysis

	Diesel	Gasoline
Distance run (km/month)	3560	3880
No of passengers	440	400
Costs (Euro)	387.2	489.3
Incomes (Euro)	576.1	644.6
Cost per km (Euro/km)	0.106	0.126
Income per passenger	1.31	1.61

Energy category indicators

Indicator 3 – Vehicle fuel efficiency

Figure 3: Vehicle fuel efficiency

	DACIA Diesel	OPEL Gasoline (premium)
Consumption of fuel (litres/100 km)	8.6	9.8
Energy value (MJ/l)	38.5	39.5
Vehicle energy efficiency (MJ/vkm)	3.31	3.87

Local indicator 1 – LPG fuel sales

Before the last quarter of 2005, according to the results obtained at the CATCH project data collection, the LPG fuel was sold at 6 locations (out of a total of 11 petrol stations), quite uniformly spread within the city. These 6 stations were: SHELL, LUKOIL - Calea Unirii Street, PETROM, ODN, OIL Dumitru Negru Company – Rulmentului Street and FLUID OIL. In total they sold in 2005 2,400,000 litres per year.

Local indicator 2 – Total number of taxis fuelled with LPG fuel

At the beginning of the project in 2005, the private taxi fleet consisted of 60 vehicles and provided service throughout the city. With the increased demand for mobility it was expected that this number would grow during the 4 years of the SMILE project. The project team focused on influencing the new taxis to rely more on LPG fuelled vehicles, either via conversion to LPG using the input offered by the authorised garages to install these systems at time of purchase, or preferably by direct procurement with LPG powered engines. The second scenario was very much supported by the decision taken at Renault-Dacia in Romania to fabricate vehicles fuelled with LPG. They have been launched on the market in 2007.

Environment category indicators

For the environment indicators the measuring process referred to the vehicles monitored for the economic performances.

Indicator 8 - CO_2 emissions
The value resulted at by measuring the tailpipe emission produced by a diesel fuelled engine for a DACIA Logan (Euro 4, 1.5 MPI) taxi was 151 g CO_2 per kilometre driven. The OPEL car (Euro 4, 1.6 MPI) gasoline fuelled taxi's emissions value was 195 g/km.

Indicator 9 – CO emissions

The value resulted at measuring the tailpipe emission produced by a gasoline fuelled engine for a DACIA Logan (Euro 4, 1.5 MPI) taxi diesel fuelled was 0.325 g CO per vehicle and kilometre run. The OPEL car (Euro 4, 1.6 MPI) gasoline fuelled taxi's emissions value was 0.670 g CO /km.

Indicator 12 - Noise perception

The impact of LPG fuel on noise within general traffic is minimal and has not been considered further for this measure.

Society category indicators

Indicator 13 - Awareness level

To establish a baseline for citizens' acceptance level for measures related to finding the best pattern for urban transport in the city of Suceava, the "CATCH – Clean Accessible Transport for Community Health" project results were considered and furthermore exploited. These sub-indicators referred to the citizens' knowledge about the project measures and objectives, accessibility of information, the quality (accuracy) of information, the quantity of information and the channels used to deliver the information. The evaluation results emphasised a high level of knowledge 75% for the LEZ extension (for various reasons, including the direct and instant impact on all citizens), 67% for alternative fuels and vehicles and 58% of the interviewed sample recognised the measure taken to rehabilitate the trolleybuses with the view of reducing the pollution caused by PT.

These results and conclusions were very useful in building the promotion campaign strategy and the dissemination activities and tasks.

Indicator 14 - Acceptance level

To establish a baseline for acceptance level, the CATCH project results were taken, regarding the public perception, acceptance and attitudes toward the measures implemented, and in general toward demo measures that tackled issues about environmental friendly measures related to increasing the attractiveness of public transport. The mentioned project was focused on demonstrating at a small scale the impact upon the environment of the LPG fuelled vehicles, the feasibility and effect of the introduction of emission reduction systems on municipal vehicles and vehicles performing PT, the citizens' perception on LEZ and the perspective of transforming the city centre into a pedestrian area, hosting quality walking facilities. This project became a forerunner for all the forthcoming measures related to urban road traffic and innovative solutions devised to respond to the new mobility demand in the context of the rapid economic development.
The introduction of CATCH measures was regarded with satisfaction by the majority of respondents. 70% of these respondents agreed with alternative/LPG fuel promotion, 61% of them agreed with the introduction of LEZ in the city centre; the others' opinions were mainly situated on the three intermediary levels of agreement. The disagreement of 25% of the interviewed sample came from private car users and non-PT means users. 61% of the respondents were negative with regard to the installation of FPT systems on PT vehicles. That was a good start for the City Hall to begin treating the problems caused by the PT fleet more radically, undergoing a serious modernisation of the vehicles and facilities offered to PT users. With regard to the PT passengers group, they had a positive attitude (48%), a moderate attitude (27%) and a negative attitude (25%) for the LEZ partial introduction. Another important measure for this category was the promotion of alternative vehicles and LPG fuel, their answers were positive for 60% of the interviewed persons, whilst 20% had a neutral and 20% a negative attitude. As regards the cleaner vehicles included in the PT fleet, 64% of them showed increased interest, proving that they were the category most affected by the road traffic pollution and increased private car usage.
In extension, this study considered the category of private LPG car owners, to determine the feasibility of LPG fuel converting systems, and the percentage of 90% of the responders were satisfied with the equipment, as regard the lifetime and number of kilometres run, also with the costs of fuel consumption.
The sample groups (subject of questionnaires) addressed were chosen from all age categories, users (100) and non-users (50) of public transport. Among these categories, a demarcation line was traced between politicians' category, stakeholders that are directly influenced by such measures, operators that use into practice the results of demo measures.
Socially, this project had an important impact on citizens' mentalities, behaviour and understanding, preparing them to accept new bolder actions and laying the foundation for implementing more outstanding measures and innovative solutions for urban public transport. Practically, these results and conclusions were very useful in building the promotion campaign strategy considering the perception and the degree of interest shown by each category apart.

C1.3 Building the business-as-usual scenario

The main issue to be considered here is the growth of the overall fleet that is happening in parallel with the hoped for increase in LPG fuelled vehicles.

This involves comparing a situation where in 2005 there were no LPG taxis in a total fleet of 60, to a current fleet of 257 where there are 85 LPG vehicles requires some assumptions to be made. These include:

- That 38% non-LPG vehicles in both scenarios are diesel and 62% are gasoline (national split data)
- That each taxi on average travels 3730 km per month (derived from data in section 2.1)
- Without the measure the taxi fleet would have increased in total number, but no LPG vehicles would exist

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

Indicator 1 - Operating revenues and **Indicator 2 - Operating costs**

Figure 4: Data necessary for economic performance analysis

	Diesel	Gasoline	LPG
Distance run (km/month)	3560	3880	3750
No of passengers	440	400	425
Costs (Euro)	387.2	489.3	312.6
Incomes (Euro)	576.1	644.6	625.3
Cost per km (Euro/km)	0.106	0.126	0.083
Income per passenger	1.31	1.61	1.47

Variations in distance travelled, income per passenger or number of passengers are unlikely to be due to the difference in fuel, or at least it will be difficult to substantiate a link. Therefore average figures of 1.46 € per passenger, 3730 km and 421 passengers per month have been used in a common calculation of the income per km to give:

Figure 5: Economic indicators

	Diesel	Gasoline	LPG
Income per km (Euro/km)	0.165	0.165	0.165
Cost per km (Euro/km)	0.106	0.126	0.083
Net Margin (Euro/km)	0.059	0.039	0.082
Net Margin (Euro/month)	220.0	145.5	305.9

This suggests that the financial performance of LPG terms of fuel cost is over twice that of gasoline and 40% better than diesel, assuming that other operating costs of the fuels are similar from the perspective of the vehicle operator.

C2.2 Energy

Indicator 3 – Vehicle fuel efficiency

Figure 6: Vehicle fuel efficiency

	DACIA Diesel	OPEL Gasoline (premium)	DACIA LPG
Consumption of fuel (litres/100 km)	8.6	9.8	12.5
Energy value (MJ/l)	38.5	39.5	25.99
Vehicle energy efficiency (MJ/vkm)	3.31	3.87	3.25

The table reflects the well known variation between the different fuels in terms of energy efficiency, where diesel and LPG are on a par, but around 15% better than gasoline, and the impact that the low energy density of LPG has when considering fuel consumption purely in terms of volume consumed.

When taken for the taxi fleet as a whole:

Current 2008 situation: 40520 GJ per year
Business as usual scenario: 42070 GJ per year
Reduction: 1550 GJ per year
% reduction: 3.7%

Local indicator 1 – LPG fuel sales

LPG fuel sales represent an important indicator as they give an insight for the fuel demand, consumption and geographical area of distribution.
By the end of the first quarter of 2006, there were nine fuel stations selling LPG: LUKOIL - Calea Unirii Street, PETROM, ODN, OIL Dumitru Negru Company – Calea Unirii, LUKOIL (the former OIL Dumitru Negru Company – Rulmentului Street), FLUID OIL, ROZ OIL, MOL (the former SHELL) and PECO MANDACHI. These are the main fuel stations located in Suceava city and they successfully sell LPG beside the other fuels. By the end of 2006, the ODN fuel station was demolished, for modernisation reasons, as the small area where this station was based became part of a bigger project, for building a commercial centre and a parking area. At the end of 2006 they sold in total approximately 2.620.000 litres per year, 9.17% more that in 2005.
The city doesn't provide space to plan the building of more stations, due to its configuration and compactness. But, spatially, these stations are quite uniformly spread across the city and if seeking solutions to increase sales they can be found in boosting the demand through increasing the number of cars that are LPG fuelled.

In 2007, the sales reached the value of 3,230,000 litres per year, with 34.58% more LPG than in 2005.
There were no available data within the sales stations about the purchasers' identity, but we estimate that this trend was mainly due to the demand coming from the public private transport operated by buses, minibuses and taxis. The choice of making investments in the LPG conversion systems for the fuelling option within private transport was motivated by financial reasons primarily, but as concepts "Eco-routes" and "environmentally clean areas" are widely known, (as was proved in the section 'Society Indicators'), we state that the cleaner fuels are also well regarded from the environmental point of view.

Local indicator 2 – Total number of LPG fuelled taxis

In 2005 the taxi fleet consisted of 60 vehicles, mainly old model of DACIA, fuelled with gasoline.

In 2006, locally collected data showed 53 LPG fuelled taxis operating in the city area.

The same figures in 2008 revealed that according to the data offered by the City Hall department in charge with issuing authorisations, in the middle of 2008 there are 257 taxis providing city transport, out of which 79 vehicles are new models of DACIA Logan. Out of these, 48 vehicles represent the model launched in 2007 with LPG fuelling from the manufacturer. Another 37 are older cars that have been converted to LPG.

In consequence, we can estimate that currently there are at least 85 LPG fuelled taxis operating in Suceava city and their number can increase as a result of the promotion campaigns to come. Compared to the data available in 2005 when the taxi fleet consisted of 60 vehicles and the LPG utilisation was not known, at the moment 31.13% of the entire fleet is LPG fuelled. Although, there is no regulation enforced yet to impose the type of vehicle and fuelling for these vehicles, we appreciate that results obtained through the project SMILE are important as it started and set the foundations for the LPG fuel market and LPG fuelled vehicles in Suceava city, tackling the public transport segment. Having got this experience so far and the initiative reaching a kind of maturity, the project team will tackle the topic at the political level, in order to influence the introduction of legal provisions – different taxation rules for city taxi operation within the city.

C2.3 Environment

Indicator 8: CO_2 Emissions

Taxi fleet:

The new DACIA Logan, LPG fuelled produced a CO_2 emission of 124 g CO_2 per kilometre run.

Comparison with baseline data shows a 27g/km (18%) improvement in comparison with the diesel vehicle and a 71g/km (36.5%) improvement in comparison with the gasoline equivalent.

Current 2008 situation: 1844.3 tonnes CO_2 per year
Business as usual scenario: 2050.8 tonnes CO_2 per year
Reduction: 206.5 tonnes CO_2 per year
% reduction: 10.1%

General Fleet
This assessment is related to the quantity of LPG fuel sold in 2007 in comparison to 2005, which would be translated as an environmental impact of the information campaigns focused on LPG fuel characteristics and benefits.

There was an increase in LPG fuel sales from 2005 to 2007 of 830,000 litres/year, as shown at the local indicator description. Due to the promotion campaigns, we can consider that this quantity of LPG was sold to the detriment of diesel and gasoline. Therefore, this 830,000 litres LPG/year would have produced in the combustion process an emission of 992 g CO_2/l, therefore 823,360 kg CO_2 total.

If instead of LPG, fuel sales would have been diesel, taking into account the higher energy density of diesel then 571040 litres of diesel would have been sold, resulting in CO_2 emissions of 1,002,640 kg / year at 1756 g CO_2/l, showing a benefit to LPG of 179,280 kg CO_2 emissions for one year.

If instead of LPG, fuel sales would have been gasoline, taking into account the higher energy density of gasoline then 650,720 litres of gasoline would have been sold, resulting in CO_2 emissions of 1,294,800kg / year at 1990 g CO_2/l, showing a benefit to LPG of 471,440 kg CO_2 emissions for one year.

Clearly the actual picture will be somewhere between these two figures, probably closer to the latter figure due to the 62:38 % share of the vehicle market in favour of gasoline over diesel i.e. approx 360 tonnes CO_2 emissions for one year for the whole fleet.

Comparison with the taxi implies that the majority of the improvement has been made by targeting the taxi market, which is more easily influenced by the cost savings for using LPG and which on average has a much higher annual vehicle mileage, than the wider private vehicle market.

Indicator 9: CO Emissions
Applying the same methodologies to CO:

Taxis

Comparison with baseline data shows a 0.095 g/km (29%) worsening in comparison with the diesel vehicle and a 0.25 g/km (37%) improvement in comparison with the gasoline equivalent.

Current 2008 situation: 5747 kg CO per year
Business as usual scenario: 6199 kg CO per year
Reduction: 452 kg CO per year
% reduction: 7.3%

General Fleet

Increase from LPG sales vs diesel: 631 kg CO per year
Reduction from LPG sales vs gasoline: 1660 kg CO per year

Approx fleet average reduction: 789.5 kg CO per year

Indicator 10: NOx Emissions
Applying the same methodologies to NOx, and assuming modelled NOx values for Euro 2 diesel, Euro 2 gasoline and LPG vehicles from COPERT:

Taxis

Current 2008 situation: 5133 kg NOx per year
Business as usual scenario: 5282 kg NOx per year
Reduction: 149 kg NOx per year
% reduction: 2.8%

General Fleet

Reduction from LPG sales vs diesel: 3718 kg NOx per year
Increase from LPG sales vs gasoline: 1859 kg NOx per year

Approx fleet average reduction: 260 kg NOx per year

Indicator 11: Particulate Emissions

Applying the same methodologies to particulate matter, and assuming modelled PM values for Euro 2 diesel, Euro 2 gasoline and LPG vehicles from COPERT:

Taxis

Current 2008 situation: 293 kg particulates per year
Business as usual scenario: 437 kg particulates per year
Reduction: 144 kg particulates per year
% reduction: 33.1%

General Fleet

Reduction from LPG sales vs diesel: 664 kg particulates per year

Approx fleet average reduction: 252 kg particulates per year

Figure 7: Summary Table

		CO_2	CO	NOx	PM
Taxi Fleet	Current (2008) Situation	1844.3 T / yr	5747 kg / yr	5133 kg / yr	293 kg / yr
	Business as usual scenario	2050.8 T / yr	6199 kg / yr	5282 kg / yr	437 kg / yr
	Total Reduction	206.5 T / yr	452 kg / yr	149 kg / yr	144 kg / yr
	% Reduction	10.1%	7.3%	2.8%	33.1
General Fleet	Total Reduction	360 T / yr	789.5 kg / yr	260 kg / yr	252 kg / yr

C2.4 Transport

N/A

C2.5 Society

Indicator 13 – Awareness level

Within the questionnaire related to general public, we included the question regarding the awareness of the SMILE project and nominally the measures implemented. The question was:

Figure 8: Centralised answers to question "Have you heard of the SMILE project and the following measures implemented as part of the project?"

	Yes	No
2006 – Promotion of the alternative fuels, LPG and biogas	162 (42.6%)	218 (57.4%)
2008 - Promotion of the alternative fuels, LPG and biogas	297 (78.2%)	83 (21.8%)

Obviously, the percentage of those who heard of this group of measures increased in 2008 compared to 2006 and it is foreseen that with the new campaigns to be organised this year, we intend to raise the figure as close as possible to 100% of people with awareness for these measures.
In order to create a more detailed breakdown of the level of knowledge regarding the alternative fuels and cars, another question was included into the questionnaire: *"Which of the following concepts are already known?"*

Figure 9: Centralised answers to question "Which of the following concepts are already known?"

	I know quite a lot	I know and I want to learn more	I don't know and I want to learn	I don't know and I think it's unimportant
2006				
Alternative fuels – LPG and biogas	44.2%	42.9%	5.8%	7.1%
Alternative cars with LPG – available option of less pollutant vehicles	34.5%	42.1%	8.2%	15.3%
Alternative vehicles electric and hybrid – an option for future non-pollutant vehicles	27.9%	33.2%	25.0%	14.0%
FPT systems – an older solution for filtering car emissions	34.7%	37.9%	11.8%	15.5%
2008				
Alternative fuels – LPG and biogas	48.2%	39.7%	4.0%	8.2%
Alternative cars with LPG – available option of less pollutant vehicles	45.0%	32.9%	10.5%	11.6%
Alternative vehicles electric and hybrid – an option for future non-pollutant vehicles	30.5%	39.0%	21.6%	9.0%
FPT systems – an older solution for filtering the car emissions	40.5%	33.4%	12.1%	14.0%

Converting these to index values gives the following analysis of change over time:

Figure 10: Index values

	2006	2008	change	% change
Alternative fuels – LPG and biogas	1.113	1.157	0.044	4.0%
Alternative cars with LPG – available option of less pollutant vehicles	0.723	0.892	0.169	23.4%
Alternative vehicles electric and hybrid – an option for future non-pollutant vehicles	0.36	0.604	0.244	67.8%
FPT systems – an older solution for filtering car emissions	0.645	0.743	0.098	15.2%

An important conclusion results from the question reference to "Alternative vehicles - electric and hybrid – an option for future non-pollutant vehicles" which underlines the increased knowledge and interest for these vehicles, shown by nearly 70% of those interviewed and creates the good local condition for future implementation of hybrid vehicles. Also, a quota of 4-5% of those interviewed in 2006 shifted from "I don't know and I think it's unimportant" to "I don't know and I want to learn" in 2008, which is important for the success of future information campaigns. It is important to bring out here the trend of the "Alternative fuels – LPG and biogas" which had been positive at the beginning of this project (as a result of CATCH project) and it was improved with around 3% of the responders who shifted from "I know and I want to learn more" to "I know quite a lot".

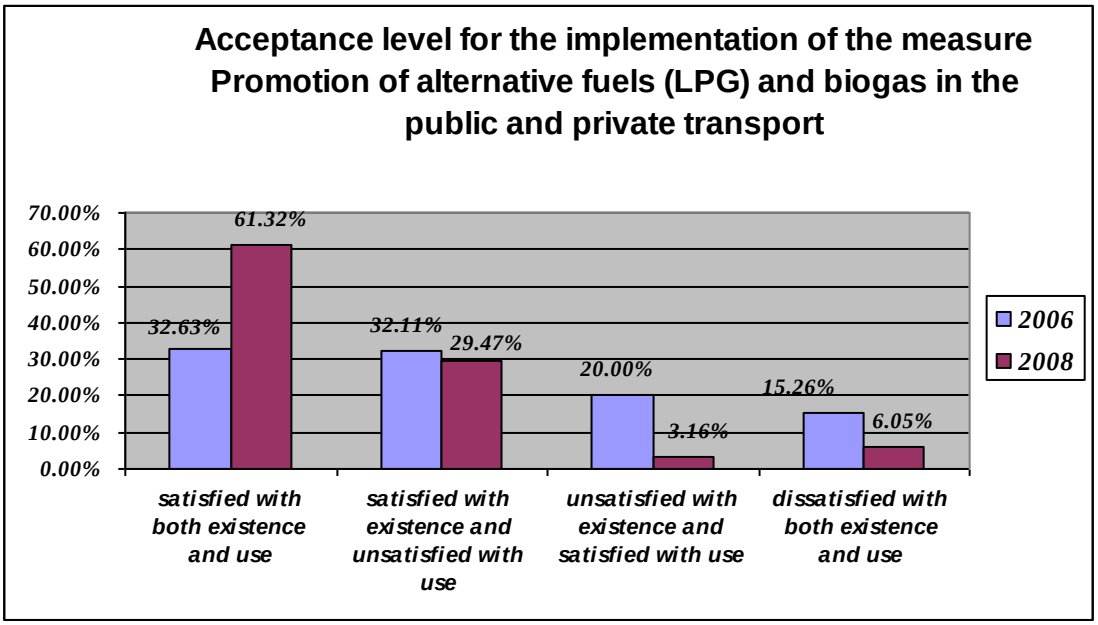
Indicator 14: Acceptance level

In order to establish the degree in which the main activities carried out in SMILE project and their outputs are accepted and the level of confidence for each of them by those who declared to have heard previously of them, within the questionnaires related to general public it was included the following question:

Figure 11: Centralised answers to question "How do you appreciate the measures taken by the City Hall within SMILE project to promote and implement a sustainable PT in SM?"

satisfied with both existence and use	satisfied with existence and dissatisfied with use	dissatisfied with existence and satisfied with use	dissatisfied with both existence and use
124	122	76	58
satisfied with both existence and use	satisfied with existence and dissatisfied with use	dissatisfied with existence and satisfied with use	dissatisfied with both existence and use
233	112	12	23

Figure 12: The acceptance level for the group of measures studied:



C3 Achievement of quantifiable targets

Figure 13: Targets achieved

No.	Target	Rating
1	Introduction of 2 private minibuses in the public transport with LPG fuel after engine conversion (5% of the current fleet) leading to a 2% reduction in greenhouse gas emission from LPG minibus owned by private transport companies	*
2	3% reduction in greenhouse gas emissions from LPG taxis	***
3	6% reduction in greenhouse gas emission from increasing (by 25%) of the number of private cars which are operated with LPG fuel	*
4	Increased number of LPG refuelling stations (from 6-9)	**
5	To create condition for development of a local and national market for alternative fuels	**
NA = Not Assessed 0 = Not achieved * = Partly achieved (< 50%) ** = Achieved in full * = Exceeded**		

C4 Up-scaling of results

There is potential to continue to run promotional campaign for clean vehicles and fuels as technological developments occur leading to further public and private sector take up. This could build on the promising results in respect of running costs, which should prove a strong influencing factor.

At the same time, the stricter national conditions regarding taxation for second hand cars and cars with a higher level of pollution will become a barrier for purchasing older, polluting cars. Also, the expected technical upgrading of the equipment which performs the periodic technical inspection of all vehicles (pollution levels and technical characteristics), every two years, will make it harder for old cars to pass the tests.

If different taxation rules will be enforced for private vehicles, it is expected to produce a change in the vehicle fuelling pattern, as the financial aspect is to be regarded as very important. We consider that turning 80% of the private public transport (minibuses and taxis) into cleaner public transport is feasible, in the years to come. This target will be aimed at by tackling other sources of clean fuels, like biogas, which will result at the end of the local Wastewater Treatment Plant rehabilitation project.

Creating this alternative source for powering motorised traffic, along with the regulation for the environmental protection and the promotion of taxes increased for polluting vehicles, it is expected to bring a boost in citizens' acceptability, mentality and an increase of confidence. By continuing the promotion campaigns for alternative fuels and vehicles after the completion of SMILE, we consider it possible to increase the usage at least by 20% in 2009.

C5 Appraisal of evaluation approach

The financial data related to operational results necessary for the evaluation report was collected from a private taxi company as a yearly average value for a LPG fuelled vehicle and a diesel vehicle, for the same type of vehicle: a DACIA Logan fabricated in 2005. The accuracy was ensured by continuous collaboration between the City Hall office which verifies the compliance with the local legal provisions and issues the authorisations for providing taxi service and the taxi companies. In the same manner, data for the gasoline fuelled vehicle was collected and processed in order to make the results accurate and comparable.

It is more difficult to make a thorough analysis of the financial performances realised by a private company, due to the confidentiality of the data, which can only be obtained if a previous agreement has been struck.

With regard to environmental indicators, the data was provided by the emission tests (free acceleration smoke analysis) performed on annual basis, for servicing purposes to ensure the legislative limits related to vehicle emissions. The datasets collected were limited to CO and CO_2 emissions, the equipment available at the garage not having facilities for measuring the NO_x and PM_{10}, which pollutant factors limit values are not yet nationally required to be met, which meant that a set of generic emissions values from COPERT were used for the NO_x and PM_{10} sections.
Although this data needs to be refined to show in a more detailed manner the real impact and considering all factors involved in determining the level of pollutant indicators, the existing technological equipment was not sufficient to collect the necessary basis information.
In the future, when the technical and technological level of the monitoring equipments will definitely be improved and the vehicle registration will demand more detailed information about the cars' performance indicators, the evaluation team will consider keeping record of this data base and tracking the changes incurred and the correct circumstances that caused the modification. The impact of LPG vehicles on noise within the wider fleet turned out to be too imperceptible to be worth attempting to isolate in this context.

The awareness and acceptance levels were studied for the measure implemented also, in more detail for the concepts of clean fuels and vehicles: beginning with the older versions admitted and continuing with the new ecological systems promoted for vehicles: FPT, LPG and biogas and electrical and hybrid vehicles.
To assess the local achievements in easy to determine figures, we used two local indicators: the LPG fuel sales and the LPG fuelled taxis running within the city. That would present in simple wording the direct impact of the LPG promotion campaigns and knowledge transfer, organised by the project team.

C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** – An increase in LPG fuelled taxis, both due to converted systems and launching new LPG fuelled vehicles onto the market in Suceava city and at the national level by 31.13% in 2008
- **Key result 2** – An increase in LPG fuelled minibuses operating public transport by 5% by the end of 2008
- **Key result 3 –** An increase in LPG fuel sales, by 34.57% at the level of year 2007
- **Key result 4 –** A decrease of the CO emissions measured at the tailpipe due to the LPG conversion of the gasoline fuelled taxis (37% better than gasoline and 29% worse than diesel), leading to a 7% improvement for the taxi fleet as a whole in Suceava.
- **Key result 5 –** A decrease in CO_2 emissions and reduction of greenhouse gas emission due to the taxis LPG conversion (36% better than gasoline and 18% better than diesel), leading to a 10% improvement for the taxi fleet as a whole in Suceava.
- **Key result 6 –** Good local conditions for introducing future clean vehicles - electric and hybrid vehicles - based on good knowledge and acceptability from the citizens
- **Key result 7 –** Verification of the beneficial financial impact of operating vehicles on LPG as compared with conventional fossil fuels (100% better than gasoline and 40% better than diesel)
- **Key result 8 –** Verification of the beneficial energy efficiency impact of operating vehicles on LPG as compared with conventional fossil fuels (15% better than gasoline and 1.8% better than diesel), leading to a 3.7% improvement for the taxi fleet as a whole in Suceava.

D Lessons learned

D1 Barriers and drivers

D1.1 Barriers

- **Barrier 1** – Spatial barrier (city is compact) which limited the increase in the number of LPG facilities
- **Barrier 2** – Political barrier that delayed the introduction of legal provisions to differentiate the taxation levels for the vehicles using clean fuels vs. regular fuels
- **Barrier 3** – Contextual barrier, the parallel project that would have provided the source of biogas for fuelling facilities is affected by a delay in comparison with the activities schedule and it will reach an end by middle of 2010 latest

D1.2 Drivers

- **Driver 1** – Citizens from crowded residential areas who understand and admit the traffic effects upon their life quality and health condition offered support and participated actively to the measure implementation
- **Driver 2** – Political support - EU's membership committed Romania to meeting the provisions of environmental related directives
- **Driver 3 –** Financial driver – EU budget allocated to Romania for modernising processes is destined for economic and social activities in compliance with the European development trend and conditionality
- **Driver 4 –** General attitude alteration towards the lifestyle approach
- **Driver 5 -** Openness and interest of the local educational system, involving school teachers, professors, pupils and students
- **Driver 6 -** A visionary and qualitative management of the city, tackling all the problems in an integrated manner
- **Driver 7 –** A financial benefit to taxi drivers when they use LPG as their fuel

D2 Participation of stakeholders

- **Stakeholder 1 –** The Suceava municipality staff that initiated and drove this measure forward with dedication and enthusiasm.
- **Stakeholder 2 –** Suceava's citizens and city staff who drive the project have been actively involved in the dissemination campaigns deployed. By accepting to participate at the questionnaires surveys, they gave the input necessary for the project evaluation team to draw out this report.
- **Stakeholder 3** – The educational sector – teachers and pupils/students have been open at the workshops and conferences that took place in their schools
- **Stakeholder 4 -** Car owners in general, and taxis drivers in particular, plus those who are residents in crowded residential areas, who understood and accepted the measure and the measure impact

D3 Recommendations

- **Recommendation 1 –** To continue to keep people informed continuously with regard to the possibilities and the steps ahead made by the alternative fuels
- **Recommendation 2 –** To continue deploying informing campaigns and to exploit the results from the project evaluation
- **Recommendation 3 –** To stay in touch with all the relevant public institutions and to encourage concurrent efforts for changing citizens' mentalities with regard to vehicle fuels, urban mobility and healthy conditions of life in the city
- **Recommendation 4 –** To monitor the waste water treatment plant rehabilitation project and to build the foundation on which the biogas market can develop
- **Recommendation 5 –** To continue lobbying for local legal provisions to introduce differing taxation levels for alternative fuelled vehicles and regular fuelled vehicles
- **Recommendation 6 –** To continue promoting other legal amendments regarding car access restrictions in different areas, considering clauses tied to pollution levels
- **Recommendation 7 –** To promote imposing environmental conditions for private public transport prior to authorising operation.
- **Recommendation 8 –** The analysis carried out by the project evaluation team emphasised the environmental benefits of the shift in vehicle powering source. Bearing in mind the exponential increase in private car ownership it is recommended that other cities follow Suceava's example and take similar steps to reduce the level of pollution from motorised traffic and improve the quality of life in the city, with focus on crowded residential areas where discomfort is even greater.

D4 Future activities relating to the measure

- To participate actively within the waste water treatment plant rehabilitation project Steering Committee
- To continue searching other alternative fuels sources, mainly biogas
- To exploit these first results with regard to alternative fuels and cars and extend the applicability concurring with the European regulations
- To deploy activities related to creating the alternative fuels facilities throughout the city, to make accessibility very good.