

Executive summary

In an effort to solve some of its mobility problems, the city of Coimbra decided to adopt a mobility management approach by developing and implementing site-based travel plans. With the guidance of the Municipality, the local public transport company SMTUC developed and implemented a travel plan for local oncological hospital (934 workers), as well as carried out several mobility management actions, particularly in the University Hospital and Paediatric Hospital (including campaigns, PT, carpooling, ticket discounts, etc.). Partnerships have also been established with some private companies to share part of the trips costs.

Accordingly, the city developed and implemented a travel plan at the Coimbra Oncological Hospital and implemented several mobility management actions in the adjacent University Hospital and Paediatric Hospital. In the initial stage the travel plan was focused on hospital employees. The main objective of the travel plan and mobility management actions was to contribute to a modal shift to emphasise other means of transportation besides the private car.

The key results of the measure have been the following:

- A modal shift of 10,3% from private cars to public transport at the Oncological Hospital, resulting from the implementation of the travel plan.
- An increase of operating revenues (+0,007 €/pkm). The measure induced a 28% increase of the average operating revenues related to the employees of the hospital that transferred to public transport.
- A positive contribution to energy efficiency in the city, resulting in significant energy savings in the displacement of the hospital staff (-15,1%) due to the assessed significant reduction of the energy consumption per passenger (-0,31 MJ/pkm).
- A mitigation of CO2 emissions leading to savings (-12,89 g/pkm) equal to 273 ton of CO2 during the first year of mobility plan implementation.

Also several informative campaigns have been carried out and as a results 1.154 children and 116 teachers and chaperones from 52 elementary schools have visited SMTUC offices.

The development and implementation of travel plans and mobility management actions in Coimbra catalysed a change in mentalities in planning technicians and local decision-makers. The participation of technicians from Municipality and SMTUC in 4 VANGUARD/EPOMM training sessions on mobility management issues also helped to transfer knowledge for the referred behaviour changes. After many decades focused on traffic management activities, Coimbra now acknowledges that mobility management solutions, especially travel plans, is a practical and valuable way of dealing with the city's mobility challenges.

The board of Administration of the University hospital has recently authorized the development of a travel plan to implement in the upcoming year. The city of Coimbra will also continue pressing the Paediatric hospital to implement a travel plan in the near future, rather than just implement isolated initiatives and actions. Also, there is a commitment from the majority of stakeholders to follow-up the existing travel plan, namely by developing a plan for hospital out patients and logistic services.

Additionally, city officials have indicated that the development and implementation of site-based travel plans is a very viable option in the future for being applied to the University campuses and local secondary schools.

A Introduction

A1 Objectives

The measure objectives are:

(A) High level / longer term:

- To improve the city air quality;
- To decrease city traffic levels;

(B) Strategic level:

- To increase the number of trips made in a sustainable way over the use of private car, in particular through a better information and the promotion about new mobility services and PT, with a special attention to young public.

(C) Measure level:

- (1) To provide at least 1 mobility plan for 1 Hospital and mobility actions for other 2 hospitals, as well as 1 partnership with 1 enterprise.
- (2) To make mobility campaigns, with special attention to the young students, including organising a “Bus-Paper” and visits to SMTUC by students from municipality primary schools.
- (3) To improve 1% the municipality PT passengers that were workers at the hospital in Coimbra where the mobility plan has been implemented.
- (4) To decrease by 5% to 10% the use of private cars of the workers at the Hospital in Coimbra where the mobility plan has been implemented.
- (5) To improve the cooperation between SMTUC and Hospitals, University and Municipality.

A2 Description

The marketing on mobility suggested in this measure for the time of the CIVITAS MODERN project was part of a global integrated strategic plan for sustainable urban mobility that the Municipality of Coimbra has been studying and developing for the coming years. This plan aims to identify the most recent evolutions in urban mobility and develop more adequate policies which can be more successful in solving the mobility challenges affecting every modern town.

The analysis included the needs of a number of entities in terms of mobility, the planning of mobility actions and the development of a site-based travel plan to be produced by the Municipality.

With the guidance of the Municipality, the local public transport company SMTUC developed and implemented a travel plan for local oncological hospital (934 workers), as well as carried out several mobility management actions, particularly in the University Hospital and Paediatric Hospital (including campaigns, PT, carpooling, ticket discounts, etc), during CIVITAS. Partnerships were also established with some private companies and contracts were carried out in which some of these entities assumed part of the trips costs (though the pass already has a reduction in its cost sustained by SMTUC and the municipality).

The travel plan and mobility actions were namely based on the following activities:

- A survey to investigate the needs of the hospital staff (according to the research conducted by the municipality).
- The promotion, among hospital employees, of the use of alternative transports – i.e., from individual private car to public transport, carpooling and others modes, including direct promotional campaigns and publishing / distribution of information – dedicated timetables, local maps with bus stop localisation, etc.
- Establishment of the hospital travel plan for the most important journeys.
- Installation in the hospitals lobbies of real time information e-panels related to the buses passage in the nearby bus stops.
- Public Transport adaptation to the needs of the hospital employees.
- Establishment of a car pooling service using the car pooling web page of the city of Porto created in the scope of the CIVITAS ELAN project.
- Yearly surveys to assess the changes in the mobility behaviour have been carried out, with focus in the modal shift.

Training of mobility coordinators has been carried out, with emphasis to 4 VANGUARD /EPOMM training sessions and dedicated training of the mobility manager was carried out in the hospital that implemented the travel plan.

Others campaigns and mobility actions were carried out in the University Hospital and Paediatric Hospital (as well as other entities such as primary schools) emphasising PT use and environmental protection promotion, through:

- Publicity/advertisement on buses and outdoors, specially dedicated to drivers.
- Visits to SMTUC by 1.154 students from schools - bus trips to demonstrate the advantages of PT were carried out.
- Organization of a “Bus-paper” (a rally-paper on a bus and other alternative transport modes) for young people and their parents.
- The SMTUC internet site.

The Municipality and SMTUC co-organised with VANGUARD a training on Social Inclusion with 66 participants from 21 cities and 12 countries.

B Measure implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- **New Conceptual Approach, Nationally** – The development and implementation of Mobility and Site-based Travel Plans are not a common practice in Portuguese planning. In fact, with the exception of one or two studies regarding the state-of-the-art, Portugal does not have any Mobility Plan approved and implemented. In Portugal the plans usually designated as “mobility plans” are centred on traffic solutions.
- **Targeting Specific User Groups, Nationally** – In Portugal, social marketing in the transportation and mobility sector is non-existent. As a result, the travel plans specified various campaigns designed to target specific employee populations in Hospitals – e.g., doctors, nurses, and other high-level officials – in order to try to alter the present behaviour regarding urban mobility.
- **New Organizational Relationships, Nationally** – The development of the travel plans and the implementation of mobility actions implies bringing the various hospital administrations into the planning process. In this sense, the planning and implementation processes involved various organizations working together to find a consensual solution to the problems – besides the hospitals, other stakeholders such as the municipality, the local police, etc, were also brought into the process. This multiparty approach to planning and implementing solutions to mobility problems is highly uncommon in Portugal.

B2 Research and Technology Development

The main initiatives regarding the research and technology development were:

- The definition and integration of several of the mobility management actions into the general mobility strategy of the city of Coimbra;
- Planning of the mobility management actions and the design of pilot travel plans.
- Research on the state of the art on travel plans in public institutions;
- Staff survey development and analysis;
- Geocoding and geo-referencing of staff information and mobility patterns;
- Development of dedicated schematic maps and destination matrixes for the hospitals;
- Development of indoor real time information panels for Hospital lobbies;
- Analysis and implementation of carpooling system in the Oncological hospital;
- Analysis and implementation of personalised travel plans for hospital employees.

B3 Situation before CIVITAS

In general, there is no tradition in developing and implementing travel plans in Portugal.

In Coimbra, mobility management has been a constant concern for the municipal authorities despite all the practical limitations that mobility management has undergone throughout the years. Although all the efforts developed to motivate the use of the public transport, the usage of private vehicles has been growing at a constant rate.

Coimbra is characterised by a strong concentration of health services (with two central hospitals which extend their influence to the whole central region of the country) and teaching services, mainly at the University level (the University of Coimbra is the oldest Portuguese University and one of oldest in Europe). Accordingly, appealing to the use of the public transport and discouraging private vehicles has been addressed to the working population and students of these areas, unfortunately with limited results.

It is vital to stimulate, to innovate, and to insist on the sensitisation of the population to the improvement of the quality of urban life, while simultaneously managing the evolution of urban growth and the correspondent definition of policies and measures regarding a sustainable urban mobility.

The implementation of travel plans for the health cluster in Coimbra in the scope of the CIVITAS MODERN project will contribute mainly for a change in the mentalities and for the involvement of several stakeholders in this problematic, as well as the opportunity to increase the knowledge on mobility management and take advantage of the experience offer by the implementation of the first site-based travel plans in Portugal.

B4 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Definition and planning of the mobility actions (*October 2008 – July 2010*) – *The planning of the actions by the Municipality, concerning the mobility management, was scheduled for a 2nd phase in order to consider the release of some definitions and specifications for a series of important projects which would imply changes in traffic and the mobility practices of people - i.e., in great part due the implementation of the tram project in Coimbra. This option has also allowed more time for training the personnel involved in this planning and in the implementation of the mobility plans and travel plans (mobility coordinators and mobility managers). For this reason the first phase was dedicated mainly to the campaigns, namely those that involve young people. Accordingly, the activities in each phase could be summarized by the following:*



- *Definitions of actions for the 1st phase:*
 - *It was decided to carry out campaigns aimed to sensitise families through their children, beginning with visits to SMTUC by students from schools, including local bus trips in order to demonstrate the advantages of PT.*
 - *Establish partnerships with some entities to create special services for the transportation of its employees / students (the partnership could be a division*

of costs between the entity, SMTUC and passenger or a simple guarantee of a minimum quantity of passengers to transport).

- *Planning the actions:*
 - *On the whole, 20 actions are expected, concerning the visit of 23 classes from 5 elementary schools, in a total of 466 children for the school year of 2009/2010. Similar quantity was expected for the next school years.*
 - *Partnerships with 2 entities (CSW and ESEnfC) were established for the transportation of its personnel on PT.*

- *Definitions of actions for the 2nd phase:*
 - *Knowledge acquisition on mobility management by researching the thematic literature and dedicated Internet websites.*
 - *Analysis of the heavily frequented sites (HFS) and selection of the principal entities to integrate and participate in the Mobility Management and Travel Plans.*
 - *In order to improve the knowledge on Mobility Management, 14 individuals involved in MODERN/Coimbra participated in the Conference “Land Use, Accessibility and Mobility Management” organized by the Portuguese Institute for Mobility and Inland Transport, with the involvement of EPOMM, in April 12-14, 2010.*
 - *Definition of the 3 hospitals and its surrounding area for the design of the travel plans for enterprises and a mobility plan for the area. Definition of the configuration for these mobility plans and foreseen measures.*
 - *Planning of campaigns with school children including the launching of a drawing contest focusing on the SMTUC transport.*

A working document with the design of pilot travel plans was delivered in July 2010.

Stage 2: Operability and accomplishment of the actions (October 2009 – October 2011) –
The first phase of actions, yet without the main part concerning the mobility plans, have consisted of:

- *Contacts with schools and signatures of partnership agreements.*
- *Planning children transport.*
- *First visit to SMTUC site (24 children and 2 teachers).*
 - *Explanation about PT advantages for sustainable mobility.*
 - *Contact with maintenance area and several system control centres, like the new GPS – Operational Support System.*
 - *Explanation about specifications and advantages of trolleybuses, electric mini-buses and mini-buses for transport of physically impaired individuals, with trips in the first two kinds of buses.*

- *Planning the transport of employees / students concerning the partnership with CSW (Small-medium enterprise) and ESEnfC (Higher-education).*



Figure B4.1 – Visit of young students from a basic school to SMTUC site

- *Survey of the needs in the mobility area of the employees / students of CSW and ESEnfC.*
- *Promotion of PT use though employees / students of CSW and ESEnfC.*
- *Implementation of the transport system for employees / students.*

During the second phase the campaigns with the children have continued and the mobility actions for the 3 hospitals were initiated in accordance with the following:1

- *Continuation of the campaigns aimed at raising public awareness through the school children with student visits to the SMTUC site (1.130 children and 114 teachers and chaperones in this phase – until the end of the school year of 2010/2011).*



Children took a picture in a model of trolleybus. Later the photos was given to each child (left). Buspaper winners(right)

Figure B4.2 – SMTUC in schools I

- *Visit to SMTUC installations by the National Engineering Society, and Sport Training School for children.*
- *Launching in May 2010 of a drawing contest for school children focusing on the SMTUC transport under the theme of “SMTUC and the Environment”.*

- *Beginning of the activities concerning company travel plans and mobility management actions for 3 hospitals and its integration in a mobility plan for the surrounding area:*



Geographical context of the Entities where Travel Plans and mobility management actions will be implemented (Left: detail of the entities; Right: localization of the entities in the surrounding urban area)

Figure B4.3 – Measure boundaries

- *Definition of the image for the mobility management actions for the health cluster with the creation of a logo and the trade mark “SanusMobilis” – Simple Actions for New Urban Sustainable **MOBIL**ity Services.*
- *Meetings with each CEO / President of the 3 hospitals in order to establish future partnerships regarding the “SanusMobilis” travel plans. A brochure with the advantages of the mobility plans and the foreseen actions was produced and given to the entities responsible;*

Medidas e Acções Tipo

- Campanhas de promoção e eventos sobre deslocações e mobilidade;
- Publicidade e outras acções de promoção;
- Assistência de viagem personalizada;
- Informação multimodal e sugestões sobre viagens;
- Melhoramentos das acessibilidades de transportes colectivos;
- Reorganização de horários de transportes colectivos;
- Tarifários de transporte integrados;
- Título de transporte de empresa / título de transporte sazonal;
- Serviços de transporte por chamada e / ou porta-a-porta;
- Serviços de “park & ride”;
- Consultor da mobilidade / gestor da mobilidade;
- Flexibilização de horário de trabalho;
- Teletrabalho;
- Gestão de estacionamento de automóveis;
- “Car pooling”;
- Melhoria de infra-estruturas para bicicletas.

**PLANOS DE MOBILIDADE
PARA UM CLUSTER DA SAÚDE DE COIMBRA**

SanusMobilis
Simple Actions for New Urban Sustainable MOBILity Services

Logos for Câmara Municipal de Coimbra, Transportes Públicos de Coimbra, and CIVITAS.



Brochure aimed to sensitize the entities involved in the mobility management actions with the SanusMobilis logo

Figure B4.3 – SMTUC SanusMobilis logo

- Indication of the mobility manager by IPOC Hospital – This action was postponed for the other 2 hospitals because they were in a process of restructuring with the aim of having a joint Board of Directors.
- Development of survey model for collecting employee information;
- Data collection concerning IPOC Hospital, such as worker displacements, traffic volume, offer of Public transportation and parking, and number of traffic accidents.
- Design and production of large panels with dedicated PT maps for the 3 hospitals, containing the surrounding bus stops, the scheme of the PT lines that pass by these hospitals and the destination matrix for the respective PT lines.
- Installation of e-panels in the hospital lobbies with the real time information concerning the buses passage in the surrounding bus stops.
- Route adjustment of the 2 more frequented PT lines in order to directly serve the Paediatric Hospital with the implementation of a bus way and a bus stop with passenger shelter near the hospital.
- Initial data collection concerning the University Hospital, such as the offer of Public transportation and the parking system
- Elaboration and execution of a general mobility survey on the whole staff;
- The addresses of the whole hospital staff have been geo-referred and the subsequent analysis related to the local PT system has been carried out

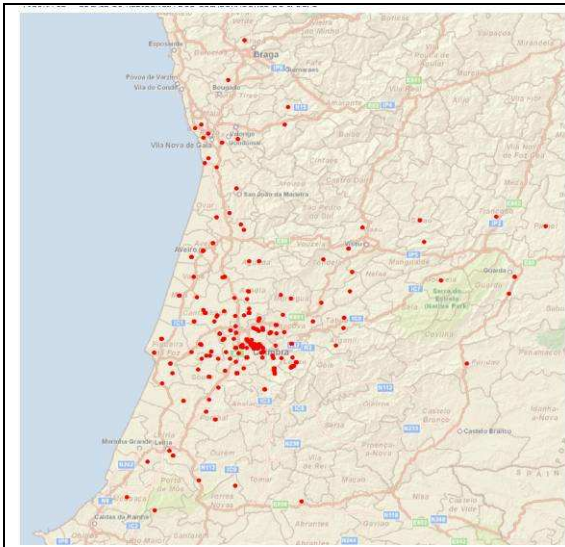
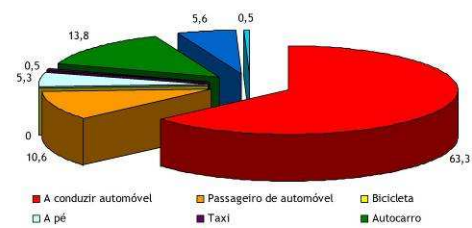


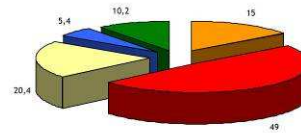
FIGURA 18 – DESLOCAÇÃO PARA O TRABALHO – DISTRIBUIÇÃO MODAL (%)



[FONTE: inquérito aos colaboradores do IPOCFG]

Analisando as atitudes dos colaboradores para alterar o seu modo de deslocação, 15% afirmam estar satisfeito com as suas deslocações e não vê razão para alterar o seu comportamento. Outros 49% declaram que gostariam de reduzir o uso do automóvel particular, mas que de momento não consideram possível fazê-lo pelas mais diversas razões. Cerca de 20% estão a considerar em alterar algumas das suas deslocações para outros modos mas não sabem como fazê-lo. 5,4% dos colaboradores inquiridos estão já a pensar em alterar algumas das suas viagens, sabendo as alternativas a utilizar, embora ainda não as tenham posto em prática.

FIGURA 19 – ATITUDE PERANTE A POSSIBILIDADE DE ALTERAR O MODO DE DESLOCAÇÃO (%)



■ Estou satisfeito e não vejo razão para alterar o meu comportamento

■ Gostaria de reduzir o uso do automóvel particular, mas neste momento não considero possível fazê-lo

■ Estou a pensar seriamente em alterar algumas das minhas viagens para outros modos de transporte mas neste momento não sei como hei-de fazê-lo

■ Estou a pensar seriamente em alterar algumas das minhas viagens para outros modos de transporte. Já sei que alternativas hei-de utilizar, embora ainda não as tenha posto em prática

■ Já utilizo outros modos de transporte na totalidade/maioria das minhas deslocações casa-trabalho

[FONTE: inquérito aos colaboradores do IPOCFG]



Geo-reference of all staff addresses (upper left) and general staff survey – roll-up in the IPOC Hospital announcing the survey (bottom left) and sample of graphics with survey results (right)

- Analysis of the staff survey and of the mobility patterns of the hospital personnel.
- Implementation of the first measures at IPOC during the European Mobility Week – i.e., installation of real-time information e-panel in the hospital lobby, installation of schematic PT maps and destination matrix in the hospital lobby, 25% discount on SMTUC park & ride services for hospital staff.



Real-time information e-panel and schematic PT maps and destination matrix in the hospital lobby(left), detail of e-panel with the real-time arrivals at the surrounding bus stops (centre) and signature ceremony of protocol for the 25% discount in the park & ride services with the participation of the mobility councillor of the Municipality and the CEO of the IPOC Hospital and SMTUC (right)

- *Execution of a promotional campaign of the RUMOS trip planner towards the IPOC staff.*
- *Execution of a promotional campaign promoting PT targeting the IPOC staff (highlighting the monetary savings in riding the bus).*
- *An information campaign has been carried out, informing the general public about the development and the implementation of the travel plans in the hospitals.*
- *Elaboration of a survey model for the “reference group” at the IPOC.*
- *Elaboration of the final version of the Mobility Plan for IPOC.*
- *Speech about “Planning and Communicating New Mobility Solutions in the City of Coimbra” during the CIVITAS Forum in Funchal.*
- *Presentation of the measure in a workshop on Mobility Management organised by the Portuguese Institute of Mobility and Inland Transportation in the Portuguese city of Évora.*
- *Meetings with the reference group of the IPOC hospital that included the attendance of the Chairman of the hospital. The meetings had the objectives to assess the monitoring of the mobility plan implementation and the collection of suggestions for future actions.*
- *Implementation of the car pooling service for the workers of the IPOC hospital. This implementation didn't have any capital costs. The IPOC workers used “Rota Partilhada”, a web service for car pooling developed in Porto in the scope of the CIVITAS ELAN project. This web service allows the creation of closed groups and for the mobility plans in the Coimbra health cluster it was created the car pooling group “SanusMobilis”.*
- *Release and analyse of the second survey for the workers of the IPOC hospital that included the modal split and modal shift assessment.*

Stage 3: Training of mobility coordinators and managers (July 2010 – April 2012) – Training of local mobility coordinators was initiated, namely through their participation in various workshops and training seminars. The most significant event was their participation (3 SMTUC and Municipality members) in the Training on Mobility Management and Company Travel Planning organized by VANGUARD/EPOMM in Szentendre, Hungary in November 2010, as well as the participation of 2 SMTUC mobility coordinators on the VANGUARD training workshop on Social Marketing (Toulouse, 17-18 May 2011..

On 22nd and 23rd March SMTUC and VANGUARD organized in Coimbra a training on Social Inclusion with 66 participants from 21 cities (5 Portuguese) and 12 European countries.

B5 Inter-relationships with other measures

The measures 02.05, 04.02, 04.05 and 08.03 were identified as a group of measures because each one of them had the potential to generate impacts on modal split. These measures also have potential to generate impacts on emissions. However, those impacts derive from modal split changes. Measure 04.05 was applied only to a health cluster that involves 3 hospitals and modal split impacts were measured with specific surveys for these hospitals, making it possible to determine separated impacts on modal split due to measure 04.05. For this reason, only measures 02.05, 04.02 and 08.03 are included in the modal shift bundle of measures.

Moreover, the measure is related to other measures as follows:

- **Measure no. 02.05** – The New Ticketing System in Coimbra will also have impacts on the modal shift and on the emissions in the Coimbra region. It is also been foreseen to use the system to provide new ticketing products for the entities involved in the mobility plans;
 - **Measure no. 04.02** – The Infomobility Centre in Coimbra also had impacts on the modal shift and on the emissions of the Coimbra region. The Centre also promotes the mobility campaigns and travel plans concerning the entities involved in the mobility management actions;
 - **Measure no. 08.03** – The Infomobility Tools for traffic data management in Coimbra will have also impacts on the modal shift and on the emissions, but in a greater area. At the functional level the e-panels of the GPS/GPSR – Operation Support System were integrated in the actions foreseen for the mobility plans for the 3 hospitals involved in this measure no. 04.05.
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C Evaluation – methodology and results

C1 Measurement methodology

C1.1 Impacts and Indicators

Table C1.1: Impacts and Indicators for the measure

No.	Impact	Indicator	Data used	Comments
1	Operating Revenues	Average Operating Revenues	Total operating revenues; Total passenger-km	Operating revenues and passenger-km were computed by the data obtained by survey. Average revenues per passenger were provided by SMTUC.
2	Operating Costs	Average Operating Costs	Total operating costs; Total passenger-km	Operating costs were provided by SMTUC. The passenger-km was computed by the data obtained by survey
3	Costs	Capital Costs	Total capital costs expended in setting up the measure	Capital costs are provided by SMTUC
4	Fuel consumption	Vehicle fuel efficiency	Total energy consumed; Total passenger-km	Fuel consumption results of the displacements assessed by survey. Bibliographic sources "Study on internal and external costs from transport in Portugal, issued by University of Aveiro, March 2011"; the average consumption of each type of vehicles and surveys to the workers of the hospital involved in the mobility plan (2011/2012)
5	Emissions	CO Emissions	Fuel type; average consumption; Vehicle Type and passenger-km	Emissions factors of each type of fuel – "European Energy Agency, "the Emission Inventory Guidebook"
6	Emissions	CO2 Emissions	Fuel type; average consumption; Vehicle Type and passenger-km	Emissions factors of each type of fuel – "European Energy Agency, "the Emission Inventory Guidebook"
7	Emissions	NOx Emissions	Fuel type; average consumption; Vehicle Type and passenger-km	Emissions factors of each type of fuel – "European Energy Agency, "the Emission Inventory Guidebook"
8	Emissions	Small Particulate Emissions	Fuel type; average consumption; Vehicle Type and passenger-km	Emissions factors of each type of fuel – "European Energy Agency, "the Emission Inventory Guidebook"
9	Modal Split	Average modal split passengers	Total passenger for the transport mode considered; Total passenger km	Surveys to workers of the hospital involved in the mobility plan (2011/2012)
10	Awareness	Awareness level	Total number of users with knowledge of the measure; Total number of respondents	Surveys to workers of the hospital involved in the mobility plan (2011/2012)
11	Acceptance	Acceptance level	Total number of users who favourably receive the measure; Total number of respondents	Surveys to workers of the hospital involved in the mobility plan (2011/2012)

The evaluation has been provided only for the assessment to the impacts in the hospital that applied the mobility plan and did not consider the impacts of other mobility actions and campaigns because in these cases the impacts were difficult or impossible to measure.

The mobility plan was only applied to the workers of the Oncological hospital (IPOC) and it was implemented in September 2011. A great part of the mobility actions implemented in the IPOC hospital focused in the promotion of the use of alternative transport modes and in the improvement of the public transport quality, accessibility and information channels. So, the shift of IPOC employees from the use of the private car to public transport provided by SMTUC has been the major expected impact of the measure implementation. This expected impact has been responsible for the selection of the major part of the indicators, because influenced the modal split, the savings in the energy consumption and emissions, as well as the operating revenues coming from the increase of the tickets sale in the SMTUC public transport service. The other selected indicators has been the operating costs and capital costs related to the implementation of the IPOC mobility plan and the society indicators selected to assess the impact of the mobility plan in the awareness and acceptance level of the IPOC staff about the measure implementation. For these reasons the information used for the evaluation is based mainly on the outputs of the surveys made to the workers of the IPOC hospital (the exceptions have been the indicators related to the costs).

Two surveys target to the hospital workers were carried out. The first survey (ex-ante) was carried out in 7-22 July 2011 before the implementation of the measure and the second (ex-post) was carried out 10-20 September 2012, after the implementation of the measure, but allowed also to assess the business-as-usual (BAU) scenario through specific questions. As agreed with the IPOC hospital administration the universe of the surveys has been all the 934 workers of the hospital since has been considered not recommended to select specific workers due the characteristic of some functions. The hospital didn't want to select and oblige appointed workers to fill the survey. The survey has been distributed to all workers by hospital intranet and during 2 days mobility coordinator and measure leader attended the hospital to provide explanation and ask to questions. The first survey had 159 respondents and the second survey had also the universe of the IPOC hospital workers but only with 54 respondents. The reason for the decrease in the respondents has been the complicated period that IPOC workers carried out together with the remaining Portuguese population due the financial crisis. Some austerity measure involving the health sector has been proclaimed and people were more concerned with their personal problems than with the mobility issues. Annex 6 show details of these surveys.

The source of the information has been the survey carried out in July 2011 (ex-ante) and it was possible to develop a methodology that allows analysing the evolution of the above indicators.

The input for the developed assessment was based on the results of the survey and it has as an objective to calculate the number of passenger-kilometres transferred from private car to urban public transport (it was verified that the other modes had internal variations but the total maintained constant). The premises for the development of the study were the following:

- The urban public transport operator (SMTUC) is the unique PT operator that serves directly the IPOC hospital;
- The IPOC hospital has a total of 934 workers. In the survey 13,8% stated that they used public transport (corresponding to 129 workers) and 63,3% stated that they used private car (corresponding to 591 workers). There were 720 workers in the 2 modes;
- From the survey it is possible to evaluate the average number of trips per passenger in these 2 modes. In 2011 the average number of trips is 3,5 per passenger per day;

- From the SMTUC management report it is possible to determine the average distance per passenger. The average distance per passenger is 3,56 km per day;
- In Portugal it was assumed that there are 240 days working days per year (source: National Statistics Institute);
- According to the SMTUC data the average revenue in 2011 is 0,3035 €/passenger;
- A load factor for PT (bus) of 16,4 passengers per bus (SMTUC data) and for private car a load factor of 1,3 passengers per car (IMTT – Portuguese Institute for Mobility and Inland Transportation) was considered.

For the above indicators 1, 2, 4, 5, 6, 7 and 8 the results from passenger-km are computed from the product of three factors: the average number of trips per passenger per day (3,5), the number of workers that had modal shift (private car to public transport – bus) and the average distance per passenger (3,56 km per trip - by the survey) – this data is obtained from the IPOC workers survey. The values of the passenger - kilometre (pkm) were calculated for the 2 modes (private car and SMTUC public transport). The total of daily workers that travel in these 2 modes were constant from the baseline to the ex-post assessment (720 workers). So for the total passenger km has been considered that the average number of displacements per day (3,5) has been also constant among the shift from private car to SMTUC public transport and the same consideration has been made for the average displacement extension per passenger (3,563 km). With the passenger-kilometres per day multiplying with the 240 working days the passenger-km per year is obtained - 720 workers x 3,5 average trips per day x 3,563 km per passengers x 240 days per year = 2.155.244 pkm per year (Annex 5).

For indicators 4, 5, 6, 7 and 8 the results from energy consumption from car and from PT bus vehicles used by the workers of the IPOC hospital are based on data about the total vehicle-kilometres performed on those vehicles. The average vehicle consumption (l/100km) is based on both bibliographic data and from real SMTUC fleet for private car and bus, respectively. For private car the source of data is the “study on internal and external costs from transport in Portugal, issued by University of Aveiro, March 2011” (9,2 l/100km). For public transport the source is the real data of the average fleet consumption (50,1 l/100km).

For private car, the average energy consumption in litres of Diesel per 100 km, is converted in energy (MJ) by a factor of 34,80 MJ/litre that is calculated by mixing 2 fuel types (Diesel -35,86 MJ/litre and Gasoline – 32,18 MJ/litre with the Portuguese 2007 fleet fuel mix 74,5% for Diesel and 25,2% gasoline. For public transport the average energy consumption (litres) is converted by a factor of 35,86 MJ/litre (Annex 1 and 2).

Detailed description of the indicator methodologies:

- **Indicator 1 (Average Operating Revenues)** – Ratio of total income generated from fares and tickets resulting of the measure implementation in the IPOC hospital divided by the total passenger-km per year (€/passenger-km).

$$A = B / C$$

where: A = Average operational revenue for the service (€/passenger-km)

B = Total operational revenue from the PT users that shifted from private cars(€)

C = Total passenger-km

The revenues resulted by the modal shift from private car to SMTUC public transport multiplied by the average revenue per passenger (0,3035 €/passenger according with SMTUC 2011 management data). All data is related to the workers of the IPOC hospital.

- **Indicator 2** (*Average Operating Costs*) – Ratio of total operating costs incurred in the implementation of the measure divided by the total passenger-km per year (€/passenger-km).

$$A = B / C$$

where: A = Average operational costs for the service (€/passenger-km)

B = Total operational costs incurred in the implementation of the measure, namely Personnel costs related with the mobility actions monitoring and mobility plans update (€)

C = Total passenger-km

Operating Costs corresponds to Personnel (mobility actions monitoring & mobility plans update).

- **Indicator 3** (*Capital Costs*) – Total capital costs expended in setting up the measure (€).

Expenditures with the purchase and installation of the necessary equipment for the measure implementation in the IPOC hospital (real time information panels, roll-ups, study and assessment) (€)

- **Indicator 4** (*Vehicle fuel efficiency*) –Ratio between the energy consumed by private car and the SMTUC public transport used by the workers of the IPOC hospital divided by the total passenger-km performed per year (MJ/passenger-km).

$$A = B / C$$

where: A = Average vehicle fuel efficiency (MJ/passenger-km)

B = Total energy consumed by the private car and by the SMTUC public transport used by the workers of the IPOC hospital (MJ)

C = Total passenger-km performed by the private car and SMTUC public transport vehicles used by the workers of the IPOC hospital

- **Indicator 5** (*CO Emissions*) – Average CO emissions per vehicle-km (g/passenger-km)

$$A = B / C$$

where: A = Average CO emissions per passenger-km (g/passenger-km)

B = Total CO emissions of the private car and public transport vehicles used by the workers of the IPOC hospital.(g)

C = Total passenger-km performed by the private car and public transport vehicles used by the workers of the IPOC hospital.

The data about the Total CO emissions per vehicle-km by private car vehicles is based on emission factors (g/kg fuel), year 2005 for Portugal, given by the European Energy Agency, “the Emission Inventory Guidebook”, dated on 23rd August 2007. The emissions factors are

computed from the average fuel consumption for each type of vehicle were it was possible to have the final energy consumption (MJ) and the respective pollutant emissions.

- **Indicator 6** (*CO₂ Emissions*) – Average CO₂ emissions per passenger-km (g/ passenger-km)

$$A = B / C$$

where: A = Average CO₂ emissions per vehicle-km (g/passenger-km)

B = Total CO₂ emissions of the private car and public transport vehicles used by the workers of the IPOC hospital (g)

C = Total passenger-km performed by the private car and public transport vehicles used by the workers of the IPOC hospital.

The data about the Total CO emissions per vehicle-km by private car vehicles is based on emission factors (g/kg fuel), year 2005 for Portugal, given by the European Energy Agency, “the Emission Inventory Guidebook”, dated on 23rd August 2007. The emissions factors are computed from the average fuel consumption for each type of vehicle were it was possible to have the final energy consumption (MJ) and the respective pollutant emissions.

- **Indicator 7** (*NO_x Emissions*) – Average NO_x emissions per passenger-km (g/ passenger-km)

$$A = B / C$$

where: A = Average NO_x emissions per passenger-km (g/passenger-km)

B = Total NO_x emissions of the private car and public transport vehicles used by the workers of the IPOC hospital (g)

C = Total passenger-km performed by the private car and public transport vehicles used by the workers of the IPOC hospital.

The data about the Total CO emissions per vehicle-km by private car vehicles is based on emission factors (g/kg fuel), year 2005 for Portugal, given by European Energy Agency, “the Emission Inventory Guidebook”, dated on 23rd August 2007. The emissions factors are computed from the average fuel consumption for each type of vehicle were it was possible to have the final energy consumption (MJ) and the respective pollutant emissions.

- **Indicator 8** (*Small Particulate Emissions*) – Average Small Particulate emissions per passenger-km (g/ passenger-km)

$$A = B / C$$

where: A = Average Small Particulate emissions per passenger-km (g/passenger-km)

B = Total Small Particulate emissions of the private car and public transport vehicles used by the workers of the IPOC hospital (g)

C = Total passenger-km performed by the private car and public transport vehicles used by the workers of the IPOC hospital.

The data about the Total CO emissions per vehicle-km by private car vehicles is based on emission factors (g/kg fuel), year 2005 for Portugal, given by the European Energy Agency,

“the Emission Inventory Guidebook”, dated on 23rd August 2007. The emissions factors are computed from the average fuel consumption for each type of vehicle were it was possible to have the final energy consumption (MJ) and the respective pollutant emissions.

- **Indicator 9** (*Modal Split*) – Percentage of passenger km by transport mode over the year (%).

$$A = B / C \times 100$$

where: A = Percentage of passenger km for the transport mode considered (%)

B = Total passenger km for the transport mode considered

C = Total passenger km

The Total passenger km for the private and public transport modes and other modes considered are measured during IPOC workers survey set up to measure the Modal Split indicator.

The questions are focused on the origin/destination, modes of transport used during trips performed by the respondents and number of passengers travelling together by private car. Furthermore, specific questions are carried out to assess changes in travel behaviour, such as the modes formerly used and the passenger.km made by the new users, before and after measure implementation.

The survey was carried out on the 934 workers of the IPOC hospital in July 2011 (before the mobility actions implementation) and repeated in September 2012 (after the introduction of the mobility actions).

- **Indicator 10** (*Awareness level*) – Percentage of the workers of the IPOC hospital with knowledge of the measure on account of provided information (%).

$$A = B / C \times 100$$

where: A = Percentage of workers of the IPOC hospital with knowledge of the measure (%)

B = Total number of respondents with knowledge of the measure

C = Total number of respondents

The Awareness level of the measure was measured during the survey to the workers of the IPOC hospital that was perform in parallel to the IPOC workers survey for the modal split assessment. In this survey was introduced specific questions relative to the knowledge of the respondent about the measure.

- **Indicator 11** (*Acceptance level*) – Percentage of the users who favourably receive the measure (%).

$$A = B / C$$

where: A = Percentage of users who favourably receive the measure (%)

B = Total number of respondents who favourably receive the measure

C = Total number of respondents

The Acceptance level of the measure was measured during the survey to the workers of the IPOC hospital that was perform in parallel to the IPOC workers survey for the modal split assessment. In this survey was introduced specific questions relative to the knowledge of the respondent about the measure.

C1.2 Establishing a Baseline

The period from July 2010 to June 2011 was considered as the baseline, before the beginning of the measure implementation in July 2011 and the start-up of the mobility actions in September 2011. However, for the capital costs the baseline has been considered the period from September 2009 to August 2010, before the beginning of the measure preparation and implementation.

Indicators 1, 2 and 3 (Operating Revenues, Operating Costs and Capital Costs):

For indicator 1 the revenues of the system was calculated based on the product of the 129 IPOC workers that use the SMTUC PT – bus (13,8% of the 934 IPOC workers) by the average number of trips per day (3,5 per passenger per day), the number of days per year (240) and by the average revenue per passenger (0,3035 €/passenger).

The values of the passenger - kilometre (pkm) were calculated by using the considered trip scenario private car and the SMTUC public transport (720 workers x 3,5 average trips per day x 240 days per year x 3,563 km per passengers = 2.155.244 pkm).

For the indicators 2 (Average Operating Costs) and 3 (Capital Costs) the values were null because before the measure implementation no costs related with the measure occurred.

Accordingly, the results of the baseline for each indicator are indicated in the tables C1.2.1 to C1.2.3:

Table C1.2.1 – Indicator 1 – Ex-ante

Indicators and respective parameters	Ex-Ante values
Revenues from the operation of the system	32.860 €
Total passenger-km	2.155.244 pkm
Average operating revenue	0,015 €/pkm

Table C1.2.2 – Indicator 2 – Ex-ante

Indicators and respective parameters	Ex-Ante values
Total Operating Costs	0 €
Total passenger –km	2.155.244 pkm
Average operating costs	0,00 €/pkm

Table C1.2.3 – Indicator 3 – Ex-ante

Indicators and respective parameters	Ex-Ante values
Total capital cost	0,00 €

Indicator 4 (Vehicle fuel efficiency):

In relation to the ex-ante scenario, it was established that all trips were performed using the initial ratio from the commuters that use the private car (591 workers) and SMTUC public transport (129 workers).

The fuel mix data source results from the share of the fuel consumption in Portugal in 2007 (source: DGEG – in Annex 1) and was calculated by the ratio of the each fuel type with all types of fuel commercialized in the road transport sector.

The vehicle fuel efficiency was calculated by the ratio between the total energy consumption considering the trips made by private car and public transport and the total vehicle-km estimated per year in the 2011 survey.

The energy consumption was, firstly based, on the passenger kilometres made by 591 IPO workers that uses private car and the 129 workers that uses PT. For both passengers, the p.km calculus were based on the number of workers transformed in passengers per year by multiplying the 129 or the 591 workers by the Average number of trips per day (3,5) with the working days per year (240) and with the average distance per passenger (3,563 km). Secondly, for both modes the p.km were transformed in vehicles kilometres (v.km) by the fraction of p.km with the load factor (16,4 passengers per PT vehicle and 1,3 passengers per private car).

The total passengers.km and v.km for private car and for SMTUC PT are the following.

Table C1.2.4 – Passenger kilometres and the v.km for Private Car and Public Transport – Ex-ante

	Private Car (PC)	SMTUC Public Transport (PT)
Passenger.km	1.769.480 pkm	385.763 pkm
Vehicles.km	1.361.139 vkm	23.522 vkm

These values will serve as input for computing the energy consumption by following formulas:

Table C1.2.5 – Energy Consumption for Private Car and Public Transport – Ex-ante

Energy consumption Private Car (PC)	Energy consumption SMTUC Public Transport (PT)
$A_{PC} = B_{PC} \times [(C1 \times D1 + C2 \times D2)/100] \times E_{PC}$ <p>A_{PC} = Energy consumption (MJ)</p> <p>B_{PC} = Estimated Average Fuel Consumption for private car (l/100km) – 9,15 l/100km</p> <p>$C1$ = Gasoline Fuel mix 2007 (%) – 25,2%</p> <p>$D1$ = Energy density for Gasoline (MJ/l) – 32,18 MJ/l</p> <p>$C2$ = Diesel Fuel mix 2007 (%) – 74,5%</p> <p>$D2$ = Energy density for Diesel (MJ/l) – 35,86 MJ/l</p> <p>E_{PC} = Distance travelled by passengers per year for private car (vkm)</p>	$A_{PT} = B_{PT} \times (D2/100) \times E_{PT}$ <p>A_{PT} = Energy consumption (MJ)</p> <p>B_{PT} = Estimated Average Fuel Consumption for public transport (l/100km) – 50,5 l/100km</p> <p>$D2$ = Energy density for Diesel (MJ/l) – 35,86 MJ/l</p> <p>E_{PT} = Distance travelled by passengers per year for public transport (vkm)</p>

The values of the energy density and fuel mix are displayed in Annex 1 and Annex 2. For detailed calculation of these values please consult Annex 5.

The table C1.2.6 shows the baseline for fuel efficiency.

Table C1.2.6 – Indicator 4 – Ex-ante

Indicators and respective parameters	Ex-Ante values
Total Energy Consumption [A]	4.760.329 MJ
A1 – Private Car	4.334.359 MJ
A1.1 – Private Car (Diesel)	3.324.385 MJ
A1.2 – Private Car (Gasoline)	1.009.974 MJ
A2 – Public Transport (Diesel)	425.970 MJ
Total passenger-km [B]	2.155.244 pkm
B1 – Private Car	1.769.480 pkm
B2 – Public Transport	385.763 pkm
Vehicle fuel efficiency [A]/[B]	2,21 MJ/pkm

Indicators 5, 6, 7 and 8 (CO, CO₂, NO_x, PT):

The source of the information has been the fuel emission factors for each pollutant given by bibliographic sources, as is displayed in Annex 4. The study considered the following emission factors (g/kg.fuel) and converted to g/MJ (by Annex 2) for the private car and public transport – bus (table 1.2.7).

Table C1.2.7 – Indicators 5, 6, 7 & 8 – Emissions Factors

POLLUTANT	CO	NO _x	CO ₂	PT
Diesel Buses (g/kgfuel)	11,88	40,75	3 140	1,85
Diesel Passenger Car (g/kgfuel)	3,2	11,28	3 140	0,72
Gasoline Passenger Car (g/kgfuel)	61,56	9,18	3 180	0,03
Diesel Buses (g/MJ)	0,277	0,949	73,115	0,043
Diesel Passenger Car (g/MJ)	0,075	0,263	73,115	0,017
Gasoline Passenger Car (g/MJ)	1,430	0,213	73,867	0,001

With the emissions factors (g/MJ) calculated in the above table and the fuel consumption per mode and fuel type (Public transport – Diesel, Private Car – Diesel and Private Car – Gasoline) shown in the table C1.2.6 we obtain the overall fleet weighted emissions factors for each pollutant.

Table C1.2.8 – Indicators 5, 6, 7 & 8 – Emissions

Pollutant	CO	NO _x	CO ₂	PT
Diesel Buses (g)	117.834	404.187	31.144.741	18.350
Private Car (g) - <i>weighted</i>	1.799.426	1.080.359	316.554.303	54.881
Total Emissions (g)	1.917.260	1.484.546	347.699.044	73.230

The indicators are displayed by the ratio between the emissions (g) and the distance travelled by the passengers per year (pkm) for public transport (385.763 pkm) and for private car (1.769.480pkm). The results of the baseline for each indicator are indicated in the table C1.2.9:

Table C1.2.9 – Indicators 5, 6, 7 & 8 – Ex-Ante

Indicators and respective parameters	Ex-Ante values
CO emissions	0,89 g/pkm
CO2 emissions	161,33 g/pkm
NOx emissions	0,69 g/pkm
PT emissions	0,03 g/pkm

Indicator 9 (Modal Split)

The modal split was assessed through the IPOC workers survey carried out in July 2011, before the beginning of the implementation of the mobility management actions. It was considered the modes private car, SMTUC public transport - bus and the other modes resulting of the survey (Annex 5).

Table C1.2.10 – Indicator n.9 – ex-ante values

Indicators and respective parameters	Ex-Ante values
Modal split – Passenger.km	-
SMTUC Bus	16,4%
Private Car	75,4%
Other modes	8,2%

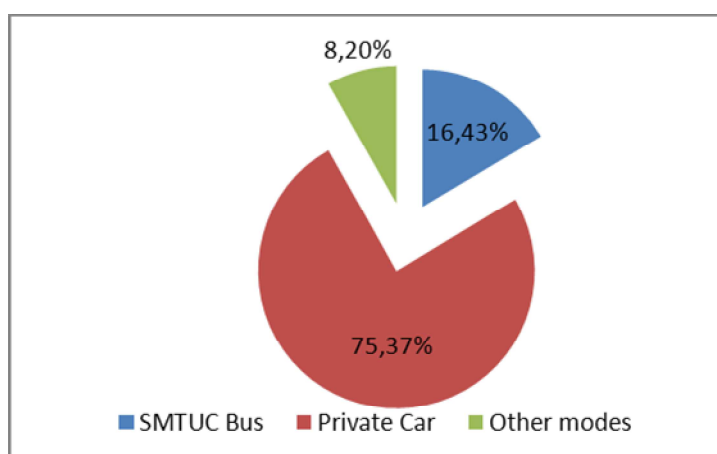


Figure C1.2.1 – Modal split – Ex-ante

Indicator 10 and 11 (Awareness level and Acceptance level)

The specific question if the respondent was favourable or not to the measure was performed in the survey was not applied before the launch of the "Mobility Management actions" because it was considered that it is not rational to ask people if they know about something which has not yet happened. So, it is considered that before something exists awareness is zero because it is impossible to know it (table C1.2.11).

A specific question about the IPOC workers acceptance of the mobility actions was carried out within the scope of the IPOC workers survey. The table C1.2.12 shows the result of the acceptance level.

Table C1.2.11 – Indicator n.10 – ex-ante values

Indicators and respective parameters	Ex-Ante values
Awareness level	0 %

Table C1.2.12 – Indicator n.11 – ex-ante values

Indicators and respective parameters	Ex-Ante values
Acceptance level	66,7 %

C1.3 Building the Business-as-Usual scenario

In the survey of September 2012, a query was made related to the modal shift of the IPOC workers since July 2011 (after the beginning of measure implementation). In this survey 9,3% of the respondents indicated that they changed to public transport without CIVITAS influence. Making the correspondence to all the 934 workers has been calculated the workers that changed in the BAU scenario – 86 workers. Taking into account this modal change the related indicators 1, 4, 5, 6, 7, 8 and 9 were assessed for the business-as-usual scenario (Annex 6 show details of the survey).

The BAU scenario reports to the period of September 2011 to August 2012, excepted for indicator 3 (Capital Costs). For this indicator the BAU scenario has been considered from September 2010 to August 2012, the same period considered for the ex-post results assessment related to the capital costs for the preparation and implementation of the measure.

Indicator 1 (Average Operating Revenues)

Without the implementation of the measure, the Operating Revenues are related to the increase of the 9,3% IPOC workers that transferred from private car to public transport (bus) without the effect of the measure. Adding these 86 workers with the 129 workers that usually uses the mode of transport gives a total of 215 workers. The passengers are calculated by using the average trips per day and the working days per year (215 workers x 3,5 trips per day x 240 days =180.600 IPOC passengers in SMTUC). These passengers generate revenues (it is considered that average revenue per passenger remains constant – 0,3035 €/passenger). For the total passengers-km (the 2 modes) is considered the total workers using private car and SMTUC public transport and that are equal to the baseline (720 passengers x 3,5 average trips per day x 3,563 km per passengers x 240 days per year = 2.155.244 pkm).

Therefore, the results of BAU scenario for this case are the following (table C1.3.1):

Table C1.3.1 – Indicator 1 – BAU

Indicators and respective parameters	BAU Values
Revenues from the workers that used SMTUC public transport	54.907 €
Total passenger-km	2.155.244 pkm
Average operating revenue (1 year / September 2011 – August 2012)	0,025 €/pkm

Indicator 2 (Average Operating Costs)

The change in the Operating Costs related to the operation of mobility management actions is obtained after setting up the measure. Therefore, without the implementation of the measure, the Operating Costs would be as before. It was considered that there are no effects of other factors that have any influence in this indicator. In this case the Business-as-usual is equal to the baseline situation.

Therefore, the results of BAU scenario for this case are shown in the table C1.3.2.

Table C1.3.2 – Indicator 2 – BAU

Indicators and respective parameters	BAU Values
Operating costs	0 €
Total passenger-km	2.155.244 pkm

Average operating costs (1 year / September 2011 – August 2012)

0,00 €/pkm

Indicator 3 (Capital Costs)

Without the implementation of the measure, the capital costs would be as before. It was considered that there are no effects of other factors that have any influence in this indicator. In this case the Business-as-usual is equal to the baseline situation.

Therefore, the table C1.3.3 shows the results of BAU scenario for this case.

Table C1.3.3 – Indicator 3 – BAU

Indicators and respective parameters	BAU values
Total capital cost (1 year / September 2010 – August 2011)	0,00 €
Total capital cost (1 year / September 2011 – August 2012)	0,00 €

Indicator 4 (Vehicle Fuel Efficiency)

Without the implementation of the measure, the energy consumption was related to the shift of the 9,3% IPOC workers (86 workers) from the private car to the SMTUC public transport (bus). With this premises it was assessed the impact of the increase in the public transport use and the related decrease of private car. For computing the energy consumptions for each mode it was considered the following, as already explained in baseline scenario:

- Total passengers in private car (591-86=505);
- Total passengers in SMTUC public transport - bus (129+86=215);
- The average number of trips is 3,5 per passenger per day;
- The average distance per passenger is 3,56 km per day;
- Working days per year is 240 days;
- Load factor for SMTUC PT (bus) of 16,4 passengers per bus and for private car a load factor of 1,3 passengers per car.

The energy consumption was, firstly based, on the passenger kilometres made by 505 IPO workers that uses private car and the 215 workers that uses PT in the BAU scenario. For both passengers, the p.km calculus were based on the number of workers transformed in passengers per year by multiplying the 215 or the 505 workers by the Average number of trips per day (3,5) with the working days per year (240) and with the average distance per passenger (3,563 km). Secondly, for both modes the p.km were transformed in vehicles kilometres (v.km) by the fraction of p.km with the load factor (16, 4 passengers per PT vehicle and 1,3 passengers per private car).

The total passengers.km and the v.km for private car and for PT are the following.

Table C1.3.4 – Passenger kilometres and v.km for Private Car and Public Transport – BAU

	Private Car (PC)	SMTUC Public Transport (PT)
Passenger.km	1.510.648 pkm	644.596 pkm
Vehicles.km	1.162.037 vkm	39.305 vkm

These values will serve as input for computing the energy consumption by the formulas expressed in Table C1.2.5 .

The calculation of this indicator is more detailed in Annex 5.

The table C1.3.5 shows the BAU for fuel efficiency.

Table C1.3.5 – Indicator 4 – BAU

Indicators and respective parameters	BAU values
Total Energy Consumption [A]	4.412.126 MJ
A1 – Private Car	3.700.347 MJ
A1.1 – Private Car (Diesel)	2.838.108 MJ
A1.2 – Private Car (Gasoline)	862.239 MJ
A2 – Public Transport	711.779 MJ
Total passenger-km [B]	2.155.244 pkm
B1 – Private Car	1.510.648 pkm
B2 – Public Transport	644.596 pkm
Vehicle fuel efficiency [A]/[B] (1 year / September 2011 – August 2012)	2,05 MJ/pkm

Indicators 5, 6, 7 and 8 (CO, CO₂, NO_x, PT):

The BAU scenario was established taking in account the emissions coming from the fuel consumption assessed for the indicator 5. The fuel consumption per mode and fuel type (Public transport – Diesel, Private Car – Diesel and Private Car – Gasoline) is shown in the table C1.3.5. The emissions factors are the same the one exposed in table 1.2.6. and the overall fleet weighted emissions factors for each pollutant were computed by the same methodology of the ex-ante scenario.

The next table show the emissions per pollutant during the BAU scenario:

Table C1.3.6 – Indicators 6, 7, 8, 9 & 10 – Emissions - BAU

POLLUTANT	CO	NO _x	CO ₂	PT
Diesel Buses (g)	196.896	675.381	52.041.642	30.661
Private Car (g) - <i>weighted</i>	1.536.213	922.328	270.250.064	46.853
Total Emissions (g)	1.733.110	1.597.710	322.291.706	77.514

The indicators are displayed by the ratio between the emissions (g) and the distance travelled by the passengers per year (pkm) for SMTUC public transport - bus (644.590 pkm) and for private car (1.510.648 pkm). The results of BAU for each indicator are indicated in the table C1.3.7:

Table C1.3.7– Indicators 6, 7, 8, 9 & 10 – BAU

Indicators and respective parameters	BAU values
CO emissions (1 year / September 2011 – August 2012)	0,80 g/pkm
CO2 emissions (1 year / September 2011 – August 2012)	149,54 g/pkm
NOx emissions (1 year / September 2011 – August 2012)	0,74 g/pkm
PT emissions (1 year / September 2011 – August 2012)	0,04 g/pkm

Indicator 9 (Modal Split)

The modal split was assessed through the IPOC workers survey carried out in September 2012 related to the modal split (Annex 6 show details of the survey). It was considered the modes private car, SMTUC public transport - bus and the other modes resulting of the survey but analysing the impact of the measure. The survey showed that there has been an increase of PT use not related to the measure implementation. For this reason the BAU scenario for the modal split has been defined by reducing in the SMTUC public transport mode the passenger.km that changed from private car to SMTUC due the measure implementation, adding this value to the private car mode. It was verified that the other modes had internal changes but the total had no changes between the baseline and the BAU scenario.

Table C1.3.8 shows the modal split during the BAU scenario.

Table C1.3.8 – Indicator n.9 – BAU values

Indicators and respective parameters	BAU values
Modal split - Passenger.km	-
SMTUC Bus	27,5%
Private Car	64,3%
Other modes	8,2%

The next figure shows the modal split in the BAU scenario.

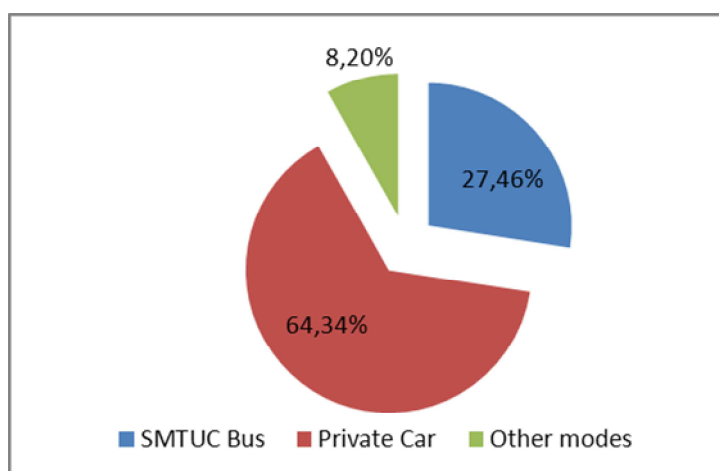


Figure C1.3.1 – Modal split – BAU values

Indicator 10 and 11 (Awareness level, acceptance level)

For awareness it was considered that before something occurs awareness is zero because it is impossible to know about something that not exist.

For the acceptance level it is considered that without the implementation of the measure, the acceptance would be as before. It was considered that there are no effects of other factors that have any influence in this indicator. In this case the Business-as-usual is equal to the baseline situation.

Table C1.3.9 – Indicator n.10 – BAU values

Indicators and respective parameters	BAU values
Awareness level (1 year / September 2011 – August 2011)	0 %

Table C1.3.10 – Indicator n.11 – BAU values

Indicators and respective parameters	BAU values
Acceptance level (1 year / September 2011 – August 2011)	66,7 %

C2 Measure results

In the survey of September 2012, a query was made related to the modal shift of the IPOC workers since July 2011 (Annex 6 show details of the surveys). In this survey 14,8% of the respondents indicated that they changed from private car to SMTUC public transport. Making the correspondence to all the 934 workers has been calculated the workers that changed since measure implementation – 138 workers. Taking into account this modal change the next sub headings presented the measure results for the indicators – economy, energy, environment, transport and society.

The Ex-post scenario reports to the period of September 2011 to August 2012, excepted for indicator 3 (Capital Costs). For this indicator the BAU scenario has been considered from September 2010 to August 2012 to allow the assessment to all capital costs spent with the measure preparation and implementation.

As referenced before, the impacts has been considered only for the hospital involved in the implementation of the mobility plan (IPOC hospital).

C2.1 Economy

With the implementation of the measure, the Operating Revenues are related to the increase of the 14,8% IPOC workers that changed from private car to SMTUC public transport (bus).

Adding these 138 workers with the 129 workers that usually used SMTUC public transport before the implementation of the measure (ex-ante scenario) gives a total of 267 workers. The passengers are calculated by using the average trips per day and the working days per year (267 workers x 3,5 trips per day x 240 days = 224.280 IPOC passengers in SMTUC). These passengers generate revenues (it is considered that average revenue per passenger remains constant – 0,3035 €/passenger). For the total passengers-km (the 2 modes) is considered the total workers using private car and SMTUC public transport and that are equal to the baseline (720 passengers x 3,5 average trips per day x 3,563 km per passengers x 240 days per year = 2.155.244 pkm).

For indicator 2 the operating cost was given the SMTUC data and it corresponds to Personnel costs (mobility actions monitoring and mobility plans update). The annual operating cost was 779 €.

For indicator 3 the capital costs were related to the equipment installed in the IPOC hospital – real time information e-panels, PT network information boards, exhibitors, studies and mobility plan release.

Therefore, the following tables show the ex-post results for these cases.

Table C.2.1.1 – Indicator n.1 – Ex-post values

Indicators and respective parameters	Ex-Post values
Operating revenues (1 year /September 2011 to August 2012)	68.069 €
Passenger.km (1 year /September 2011 to August 2012)	2.155.244 pkm
Average operating revenues (1 year /September 2011 to August 2012)	0,032 €/pkm

Table C2.1.2 – Indicator n.2 – Ex-post values

Indicators and respective parameters	Ex-Post Values
Operating Costs (1 year /September 2011 to August 2012)	779 €

Passenger.km (1 year /September 2011 to August 2012)	2.155.244 pkm
Average operating costs (1 year /September 2011 to August 2012)	0,0004 €/pkm

Table C2.1.3 – Indicator n.3 – Ex-post values

Indicators and respective parameters	Ex-Post values
Total capital costs (1 year/September 2010 – August 2011)	18.670 €
Real time information e-panels	1.990 €
PT Network information boards	472 €
Exhibitors	208 €
Studies & Mobility Plan release	16.000 €
Total capital costs (1 year/September 2011 – August 2012)	0,00 €
Car-pooling service	0,00 €

Note: The implementation of the car pooling service for the workers of the IPOC hospital didn't have any capital costs. The IPOC workers used "Rota Partilhada", a web service for car-pooling developed in Porto in the scope of the CIVITAS ELAN project. This web service allows the creation of closed groups and for the mobility plans in the Coimbra health cluster it was created the car pooling group "SanusMobilis".

The following table summarise the comparison of the indicators 1, 2 and 3 after the implementation of the measure with the baseline and the BAU scenario.

Table C2.1.4 – Summary – Balance between economy indicators (after/before and after/BAU)

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After – Before	Difference: After – B-a-U
1. Average Operating Revenues	0,015 €/passenger-km (1 year/Jul 10 – Jun 11)	0,025 €/passenger-km (1 year/Sept 11 – Aug 12)	0,032 €/passenger-km (1 year/Sept 11 – Aug 12)	0,017 €/passenger-km	0,007 €/passenger-km
2. Average Operating Costs	0,00 €/passenger-km (1 year/Jul 10 – Jun 11)	0,00 €/passenger-km (1 year/Sept 11 – Aug 12)	0,0004 €/passenger-km (1 year/Sept 11 – Aug 12)	0,0004 €/passenger-km	0,0004 €/passenger-km
3. Capital Costs	0,00 € (1 year/Sep 09 – Aug 10)	0,00 € (1 year/Sep 10 – Aug 11) 0,00 € (1 year/Sept 11 – Aug 12)	18.670 € (1 year/Sep 101 – Aug 11) 0,00 € (1 year/Sept 11 – Aug 12)	18.670 € 0,00 €	18.670 € 0,00 €

The following graph shows the evolution of average operating revenues (€/pkm) with CIVITAS and the evolution of this indicator according to the BAU scenario (Without CIVITAS).

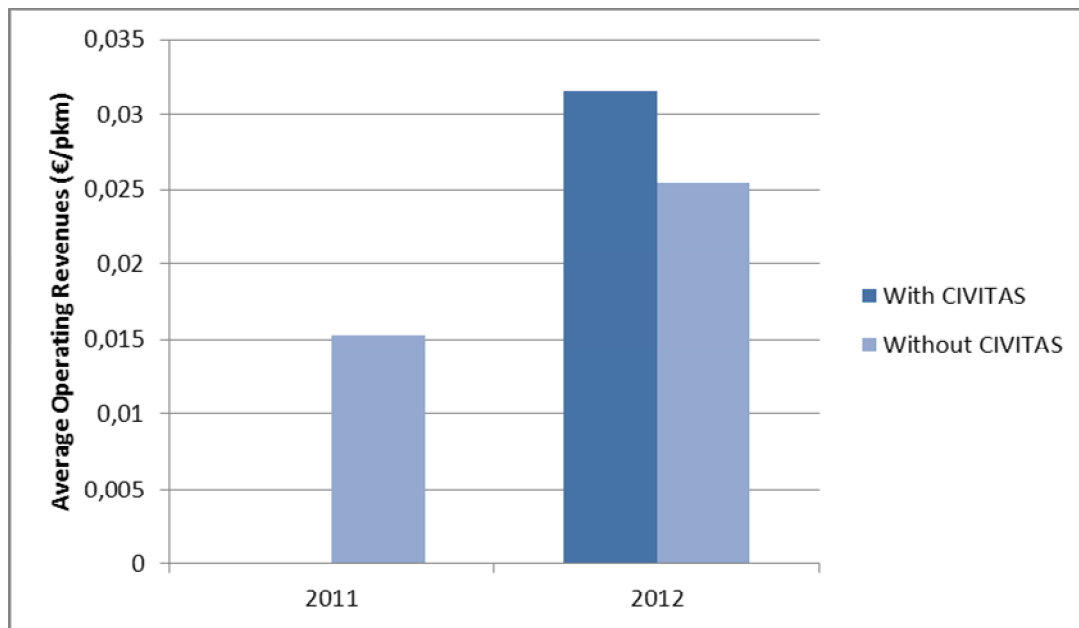


Figure C2.1.1 – Average operating revenues without/with CIVITAS

The following graph shows the evolution of average operating costs (€/pkm) with CIVITAS and the evolution of this indicator according to the BAU scenario (Without CIVITAS).

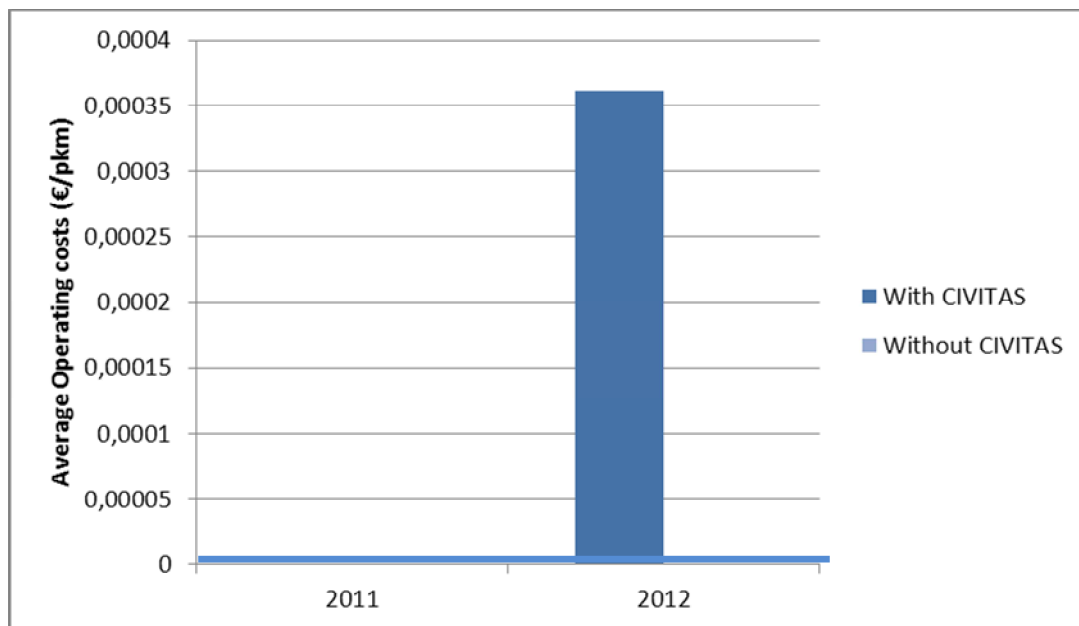


Figure C2.1.2 – Average operating costs without/with CIVITAS

The following graph shows the evolution of capital costs (€) with CIVITAS and the evolution of this indicator according to the BAU scenario (Without CIVITAS).

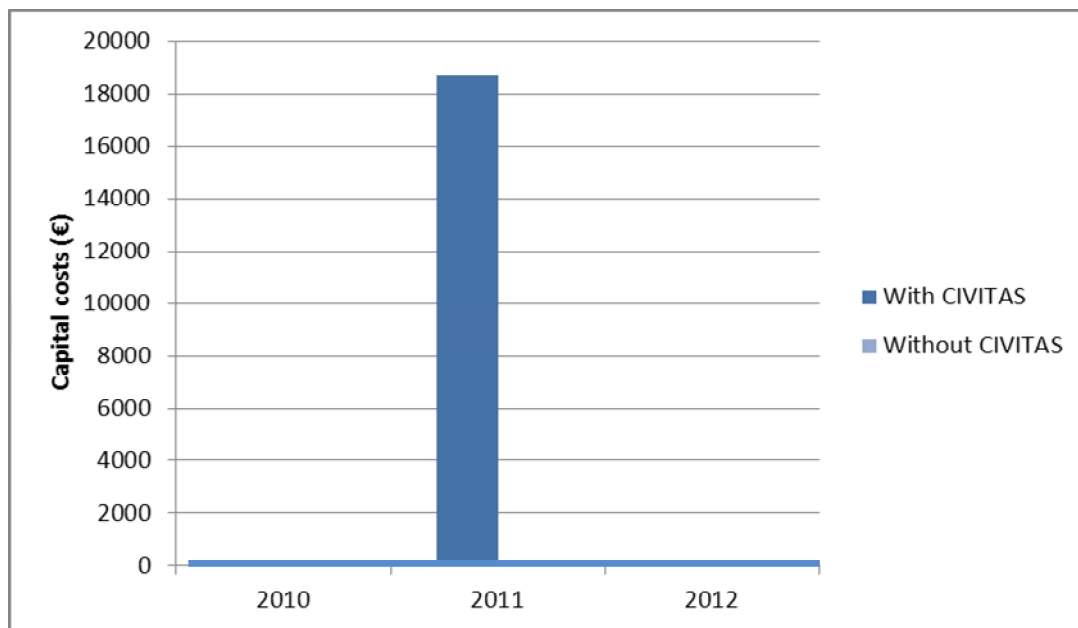


Figure C2.1.3 – Capital costs without/with CIVITAS

Analysing the economy indicators it is possible to conclude that the measure induced a 28% increase of the operating revenues related to the workers of the IPOC hospital that transferred to public transport from September 2011 to August 2012. In the same period the revenues coming from the total transfer of private car to public transport passengers increased 113,3% in the IPOC workers universe. With the CIVITAS measure the average operating costs increased 0,0004 €/pkm in comparison with the BAU and Ex-Post scenario), a value insignificant when compared with the increase in the average operating revenues (0,007 €/pkm). The increase of the operating revenues (ex-post – BAU) during the first year after measure implementation (13.162 €) were higher than the equivalent operating costs (779€) and almost all the costs incurred until this period, including the capital costs (779 € +18.670 € = 19.449 €). This fact indicates that the initial investment could be paid back in 2 years. .

C2.2 Energy

The source of information has been the surveys that allowed to estimated passenger-km per mode due to the transfer from private car to SMTUC public transport.

With the implementation of the measure, the energy consumption was related to the shift of the 14,8% IPOC workers (138 workers) from the private car to the SMTUC public transport (bus). With this premises it was assessed the impact of the increase in the public transport use and the related decrease of private car. For computing the energy consumptions for each mode it was considered the following, as already explained in baseline scenario:

- Total passengers in private car (591-138=453);
- Total passengers in SMTUC public transport - bus (129+138=267);
- The average number of trips is 3,5 per passenger per day;
- The average distance per passenger is 3,56 km per day;
- Working days per year is 240 days;

- Load factor for PT (bus) of 16,4 passengers per bus and for private car a load factor of 1,3 passengers per car.

The energy consumption was, firstly based, on the passenger kilometres made by 453 IPO workers that uses private car and the 267 workers that uses PT after the implementation of the measure. For both passengers, the p.km calculus were based on the number of workers transformed in passengers per year by multiplying the 267 or the 453 workers by the Average number of trips per day (3,5) with the working days per year (240) and with the average distance per passenger (3,563 km). Secondly, for both modes the p.km were transformed in vehicles kilometres (v.km) by the fraction of p.km with the load factor (16, 4 passengers per PT vehicle and 1,3 passengers per private car).

The total passengers.km and v.km for private car and for PT are the following:

- **Table C2.2.1 – Passenger kilometres and v.km for Private Car and Public Transport – Ex-post**

	Private Car (PC)	SMTUC Public Transport (PT)
Passenger.km	1.355.349 pkm	799.895 pkm
Vehicles.km	1.042.576 vkm	48.774 vkm

These values will serve as input for computing the energy consumption by the formulas expressed in Table C1.2.5.

The calculation of this indicator is more detailed in Annex 5

The Ex-post scenario of indicator 4 (Vehicle Fuel Efficiency) is calculated by the ratio of the energy consumption in litres, converted in MJ, of the private car and public transport use, with the passengers kilometres. The table C2.2.2 shows the energy consumption and the table C2.2.3 shows the Vehicle Fuel Efficiency indicator.

Table C2.2.2 – Indicator 4 – Ex Post

Indicators and respective parameters	Ex Post values
Total Energy Consumption [A]	4.203.205 MJ
A1 – Private Car	3.319.940 MJ
A1.1 – Private Car (Diesel)	2.546.342 MJ
A1.2 – Private Car (Gasoline)	773.598 MJ
A2 – Public Transport	883.264 MJ
Total passenger-km [B]	2.155.244 pkm
B1 – Private Car	1.355.349 pkm
B2 – Public Transport	799.895 pkm
Vehicle fuel efficiency [A]/[B] (1 year/September 2011 – August 2012)	1,95 MJ/pkm

Table C2.2.3 – Energy indicators – Ex Post, BAU and Ex-ante

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After – Before	Difference: After – B-a-U
4. Vehicle Fuel	2,21 MJ/pkm	2,05 MJ/pkm	1,95 MJ/pkm	-0,26 MJ/pkm	-0,10 MJ/pkm

Efficiency	(1 year/Jul 10 – Jun 11)	(1 year/Sept 11 – Aug 12)	(1 year/Sept 11 – Aug 12)		
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The following graph shows the evolution of Vehicle fuel efficiency (MJ/pkm) With CIVITAS and the evolution of this indicator according to the BAU scenario (Without CIVITAS).

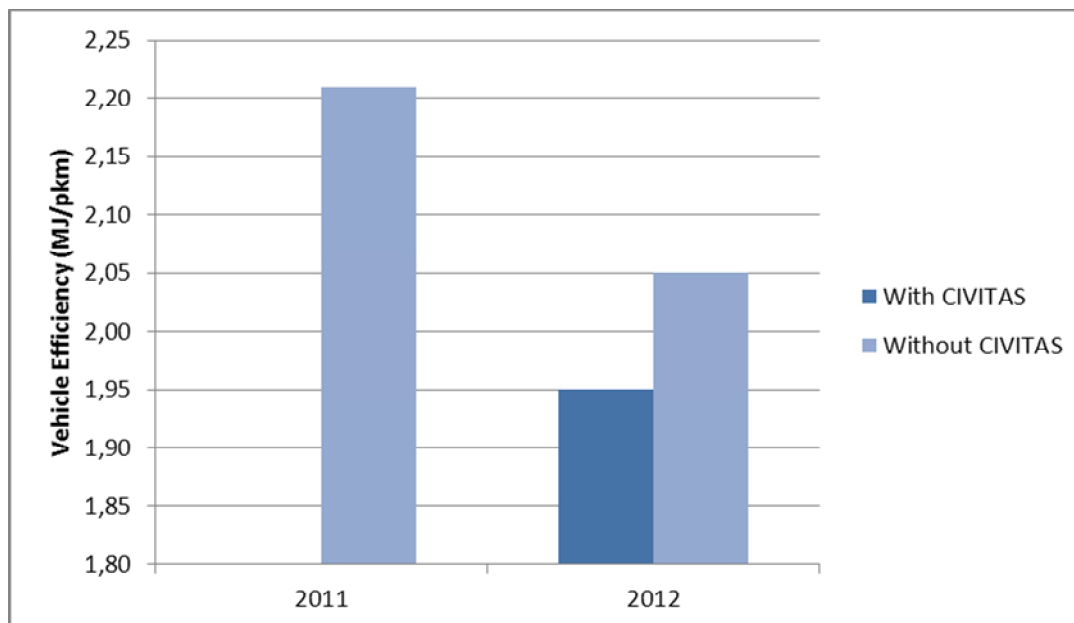


Figure C2.2.1 – Vehicle fuel efficiency without/with CIVITAS

This evolution shows that the shift from private car to SMTUC public transport – bus generates a positive impact to the vehicle efficiency (reducing 5% in relation to BAU scenario and 7% in relation to ex-ante scenario), meaning that the use of public transport in such conditions brings significant energy advantages.

This assessment was performed considering a modal shift inducing an increase of the PT offer that corresponds to the increase in the demand considering the load factor of SMTUC buses service (16,4 passengers per trip). But in reality this increase in demand did not affected the PT offer because this offer was enough to equilibrate the increase in the demand. Thus, was not verified a real increase in the fuel consumption concerning the public transport until now, but only a decrease in the consumption related to the private car. In this case the consumptions of the public transport mode for the ex-post and BAU scenario were equal to the baseline scenario and the tables C2.2.1 and C2.2.2 have the following modifications:

Table C2.2.4 – Indicator 4 – Ex Post

Indicators and respective parameters	Ex Post values
Total Energy Consumption [A]	3.745.910 MJ
A1 – Private Car	3.319.940 MJ
A2 – Public Transport	425.970 MJ
Total passenger-km [B]	2.155.244 pkm
Vehicle fuel efficiency [A]/[B] (1 year/September 2011 – August 2012)	1,74 MJ/pkm

Table C2.2.5 – Energy indicators – Ex Post, BAU and Ex-ante

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After – Before	Difference: After – B-a-U
4. Vehicle Fuel Efficiency	2,21 MJ/pkm (1 year/Jul 10 – Jun 11)	2,05 MJ/pkm (1 year/Sept 11 – Aug 12)	1,74 MJ/pkm (1 year/Sept 11 – Aug 12)	-0,47 MJ/pkm	-0,31 MJ/pkm

As expected, in this new (and actual) scenario the decrease in the fuel consumption was higher than that considered in the former scenario. In this case the vehicle fuel efficiency was 15,1% better due to the implementation of the mobility plan in the IPOC hospital and 21,3% better when comparing the global situation (before – after measure implementation).

C2.3 Environment

The source of information has been the surveys that allow estimating passenger-km per mode due to the transfer from private car to SMTUC public transport (2.155.244 pkm as shown in table C2.2.12) and the vehicle fuel consumption. The fuel consumption per each transport mode and fuel type (Private Car diesel, Private Car gasoline and Public Transport diesel) is referenced in the table C2.2.12. The emission factors for each pollutant are given by bibliographic sources, as is displayed in Annex 4. The study considered the emission factors (g/kg.fuel) and converted to g/MJ (by Annex 2) for the private car (2 fuel types) and SMTUC public transport – bus (table 1.2.6).

The next table shows the results of the total emissions per pollutant and transport mode:

Table C2.3.1 – Indicators 6, 7, 8, 9 & 10 – Emissions – Ex-post

POLLUTANT	CO	NO _x	CO ₂	PT
Diesel Buses (g)	244.334	838.097	64.579.782	38.049
Private Car (g) - <i>weighted</i>	1.378.286	827.510	242.467.520	42.036
Total Emissions (g)	1.622.620	1.665.608	307.047.302	80.085

The indicators are displayed by the ratio between the emissions (g) and the distance travelled by the passengers per year (pkm) for SMTUC public transport - bus (799.895 pkm) and for private car (1.355.349 pkm).

The results of Ex-post for each indicator are indicated in the table C2.3.2 and the comparison with the baseline and the business-as-usual scenario in the table C2.3.3.

Table C2.3.2 – Indicators 6, 7, 8, 9, 10 – Ex Post

Indicators and respective parameters	Ex-Post values
CO emissions	0,75 g/pkm
CO ₂ emissions	142,47 g/pkm
NO _x emissions	0,77 g/pkm
PT emissions	0,04 g/pkm

Table C2.3.3 – Environmental indicators - Summary– Ex Post, BAU and Ex-ante

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After –Before	Difference: After – B-a-U
6. CO emissions	0,89 g/pkm (1 year / Jul 10 – Jun 11)	0,80g/pkm (1 year / Sept 11 – Aug 12)	0,75 g/pkm (1 year / Sept 11 – Aug 12)	-0,14 g/pkm	-0,05 g/pkm
7. CO2 emissions	161,33 g/pkm (1 year / Jul 10 – Jun 11)	149,54 g/pkm (1 year / Sept 11 – Aug 12)	142,47 g/pkm (1 year / Sept 11 – Aug 12)	-11,79 g/pkm	-7,07 g/pkm
8. NOx emissions	0,69 g/pkm (1 year / Jul 10 – Jun 11)	0,74 g/pkm (1 year / Sept 11 – Aug 12)	0,77 g/pkm (1 year / Sept 11 – Aug 12)	0,08 g/pkm	0,03 g/pkm
9. PT emissions	0,034 g/pkm (1 year / Jul 10 – Jun 11)	0,036 g/pkm (1 year / Sept 11 – Aug 12)	0,037 g/pkm (1 year / Sept 11 – Aug 12)	0,003 g/pkm	-0,001 g/pkm

The following graph shows the evolution of CO emissions (g/pkm) With CIVITAS and the evolution of this indicator according to the BAU scenario (Without CIVITAS).

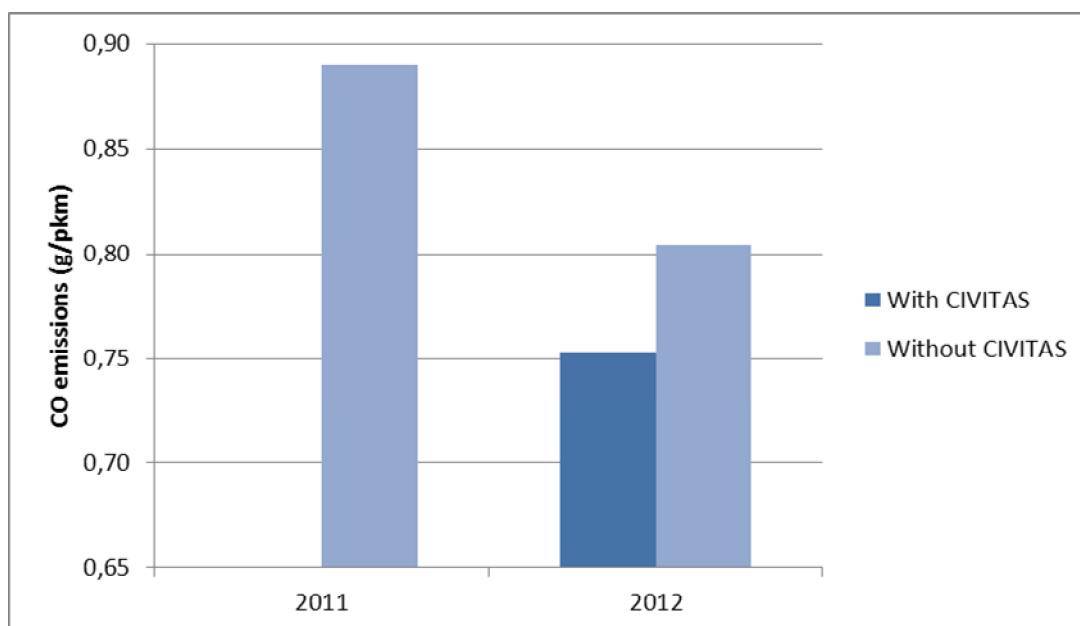


Figure C2.3.1 - CO emissions (with/without CIVITAS)

The following graph shows the evolution of CO2 emissions (g/pkm) With CIVITAS and the evolution of this indicator according to the B-a-U scenario (Without CIVITAS).

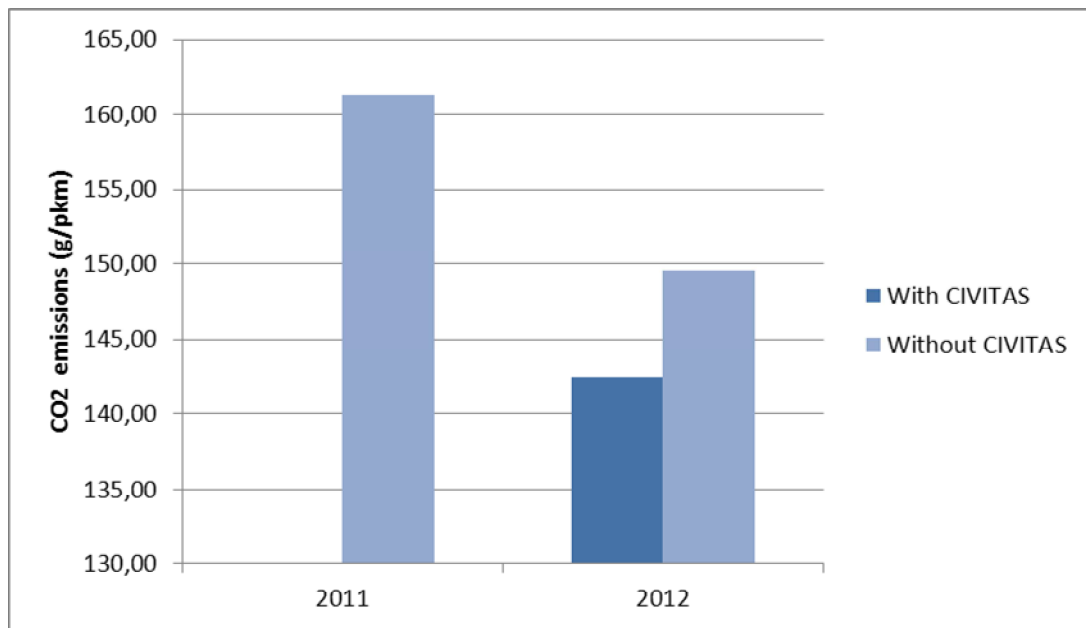


Figure C2.3.2 – CO2 emissions (with/without CIVITAS)

The following graph shows the evolution of NOx emissions (g/pkm) With CIVITAS and the evolution of this indicator according to the BAU scenario (without CIVITAS).

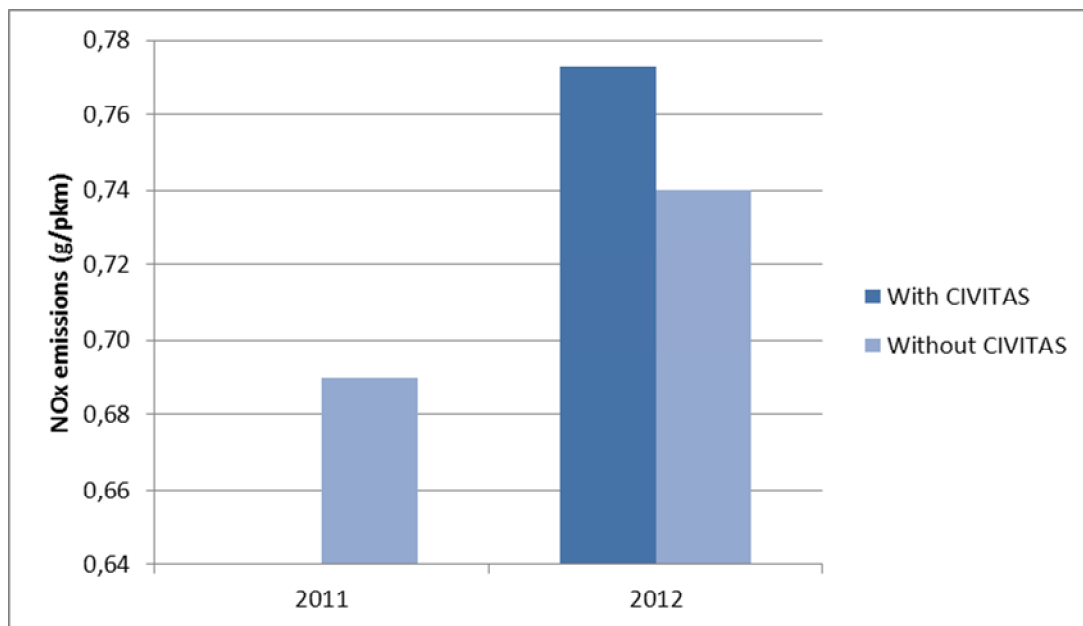


Figure C2.3.3 – NOx emissions (with/without CIVITAS)

The following graph shows the evolution of PT emissions (g/pkm) With CIVITAS and the evolution of this indicator according to the BAU scenario (without CIVITAS).

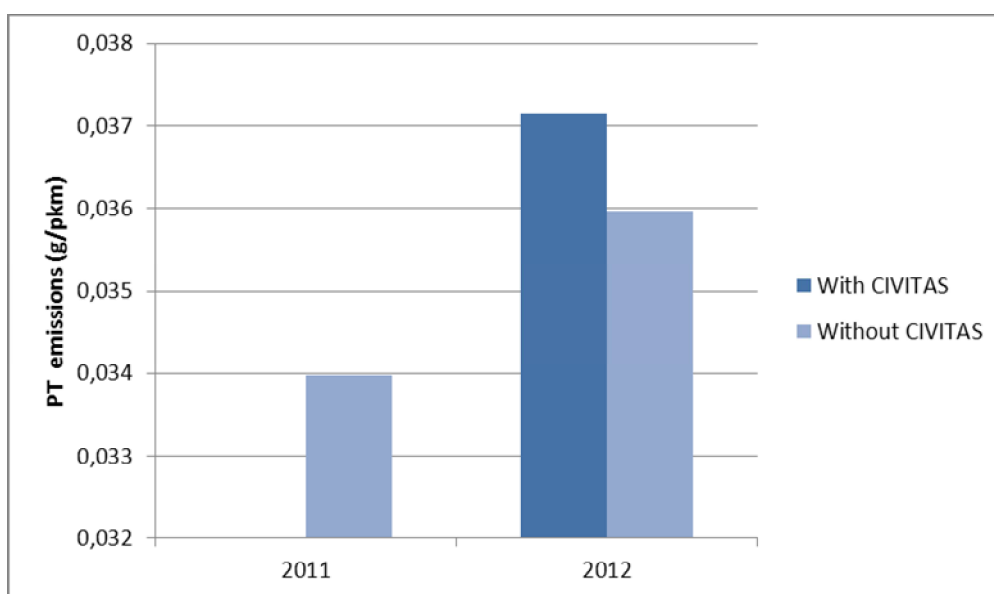


Figure C2.3.4 – PT emissions (with/without CIVITAS)

As expected, with a modal shift from private car to public transport using 100% diesel fuel, instead of using a share of gasoline / diesel vehicles, had impacts on the emissions. In the first year of the mobility plan implementation, the measure had positive impacts on the mitigation CO and CO₂ emissions, but generates a negative impacts in terms of particles and NO_x. In terms of emissions the CIVITAS measure had a positive impact of CO, CO₂ with 0,05 g/pkm, 7,07 g/pkm, respectively, and a increase of 0,03 g/pkm in NO_x emissions. The PT emissions had a little impact (0,003 g/pkm Ex-post for ex-ante and -0,001 g/pkm Ex-post for BAU).

As referenced for the fuel efficiency, this assessment was performed considering a modal shift inducing an increase of the PT offer that corresponds to the increase in the demand considering the load factor of SMTUC buses service (16,4 passengers per trip). But in reality this increase in demand did not affected the PT offer because this offer was enough to equilibrate the increase in the demand. Thus, was not verified a real increase in the emissions of pollutants concerning the public transport until now, but only a decrease in the emissions related to the private car. In this case the emissions of the public transport mode for the ex-post and BAU scenario were equal to the baseline scenario and the tables C2.3.1, C2.3.2 and C2.3.3 have the following modifications:

Table C2.3.4 – Indicators 6, 7, 8, 9 & 10 – Emissions – Ex-post scenario 2

POLLUTANT	CO	NO _x	CO ₂	PT
Diesel Buses (g)	117.834	404.187	31.144.741	18.350
Private Car (g) - weighted	1.378.286	827.510	242.467.520	42.036
Total Emissions (g)	1.496.120	1.231.697	273.612.261	60.386

Table C2.3.5 – Indicators 6, 7, 8, 9, 10 – Ex Post scenario 2

Indicators and respective parameters	Ex-Post values
CO emissions	0,69 g/pkm
CO ₂ emissions	126,95 g/pkm
NO _x emissions	0,57 g/pkm
PT emissions	0,03 g/pkm

Table C2.3.6 – Environmental indicators – Summary – Ex Post scenario 2, BAU scenario 2 and Ex-ante

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After – Before	Difference: After – B-a-U
6. CO emissions	0,89 g/pkm (1 year / Jul 10 – Jun 11)	0,77g/pkm (1 year / Sept 11 – Aug 12)	0,69 g/pkm (1 year / Sept 11 – Aug 12)	-0,20 g/pkm	-0,08 g/pkm
7. CO2 emissions	161,33 g/pkm (1 year / Jul 10 – Jun 11)	139,84 g/pkm (1 year / Sept 11 – Aug 12)	126,95 g/pkm (1 year / Sept 11 – Aug 12)	-34,38 g/pkm	-12,89 g/pkm
8. NOx emissions	0,69 g/pkm (1 year / Jul 10 – Jun 11)	0,62 g/pkm (1 year / Sept 11 – Aug 12)	0,57 g/pkm (1 year / Sept 11 – Aug 12)	-0,12 g/pkm	-0,05 g/pkm
9. PT emissions	0,034 g/pkm (1 year / Jul 10 – Jun 11)	0,030 g/pkm (1 year / Sept 11 – Aug 12)	0,028 g/pkm (1 year / Sept 11 – Aug 12)	-0,006 g/pkm	-0,002 g/pkm

The following graphs show the emissions (g/pkm) With CIVITAS and the evolution of this indicator without CIVITAS (Scenario 2).

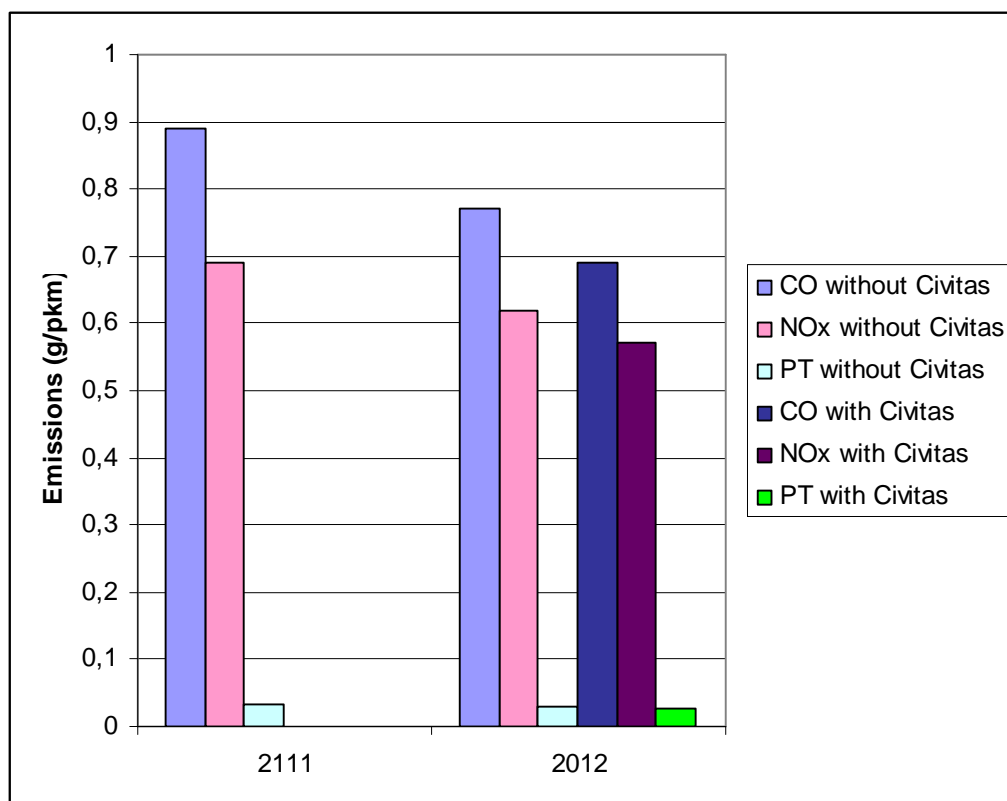


Figure C2.3.5 – CO, NOx and PT emissions according scenario 2 (with/without CIVITAS)

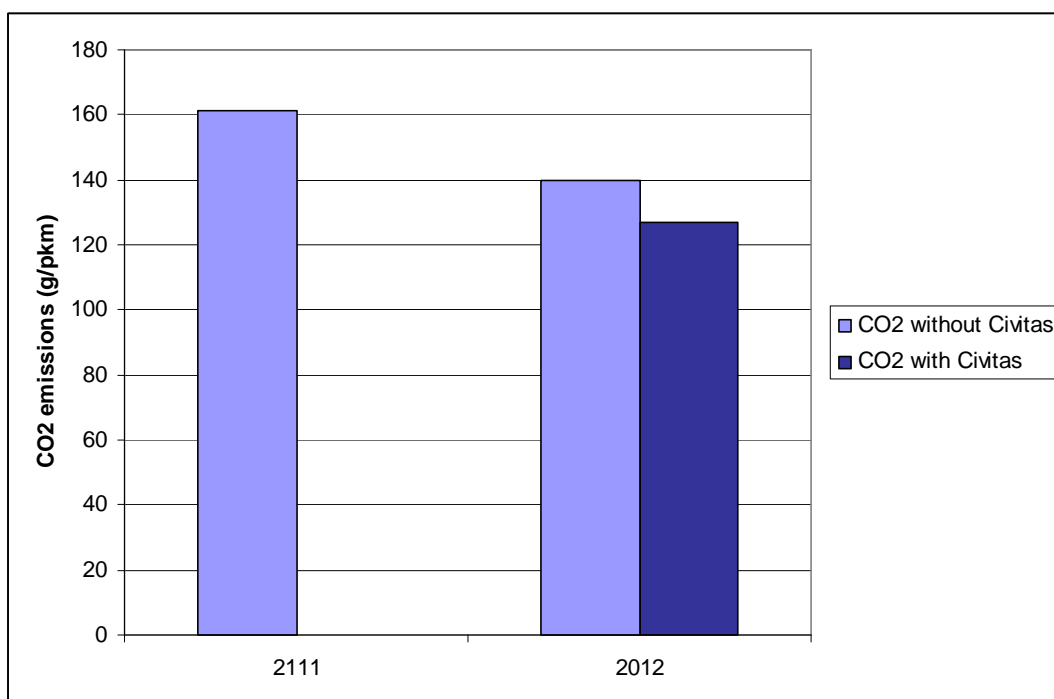


Figure C2.3.6 – CO2 emissions according scenario 2 (with/without CIVITAS)

As expected, in the new (and actual) scenario the emissions reduction was higher and occurred for all the pollutants. The decrease due to the measure effect was between 7% (PT emissions) and 10% (CO emissions) and concerning the global situation (Ex-post – baseline) the decrease had a variation from 17% (NOx emissions) to 22% (CO emissions). Only concerning the CO2 emissions, the measure allowed 273 ton of savings in the first year of the mobility plan implementation.

C2.4 Transport

The modal split was assessed through the IPO workers survey carried out in September 2012 (Annex 6 show details of the surveys).

Table C2.4.1 – Indicator n.9 – Ex-Post values

Indicators and respective parameters	Ex-Post values
Modal split – Passenger.km	-
SMTUC Bus	34,1%
Private Car	57,7%
Other modes	8,2%

The next figure shows the modal split in the Ex-post scenario.

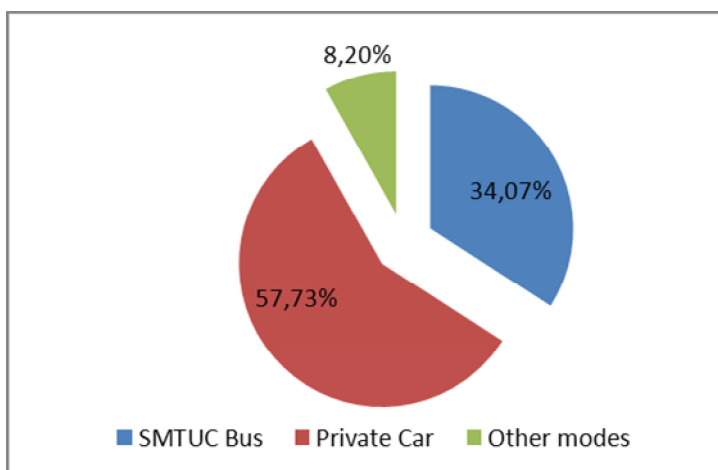


Figure C2.4.1 – Modal split – Ex-post values

The table of results of the indicators is as follows:

Table C2.4.2 – Summary – Balance between transport indicator (after/before and after/BAU)

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After –Before	Difference: After – B-a-U
9. Modal split (p.km) - %	SMTUC Bus 16,4% Private Car 75,4% Other modes 8,2% (1 year / Jul 10 – Jun 11)	SMTUC Bus 27,5% Private Car 64,3% Other modes 8,2% (1 year / Sept 11 – Aug 12)	SMTUC Bus 34,1% Private Car 57,7% Other modes 8,2% (1 year / Sept 11 – Aug 12)	SMTUC Bus +17,6% Private Car -17,6% Other modes 0%	SMTUC Bus +6,61% Private Car -6,610% Other modes 0%

For the workers who changed mode from driving to PT, the reasons behind the decision are related with the implementation of the real time PT schedules at the IPO facilities (about 30% of the answers) and because of the improvement in the quality of the public transport fleet and services (over 30% of the responses).

On the other and, the main reasons behind the attitude towards the change can be analyzed on the graphic below. There are 15% of responses for whom the actual situation is comfortable and with no reason to change the behaviour as we can see on the graphic.

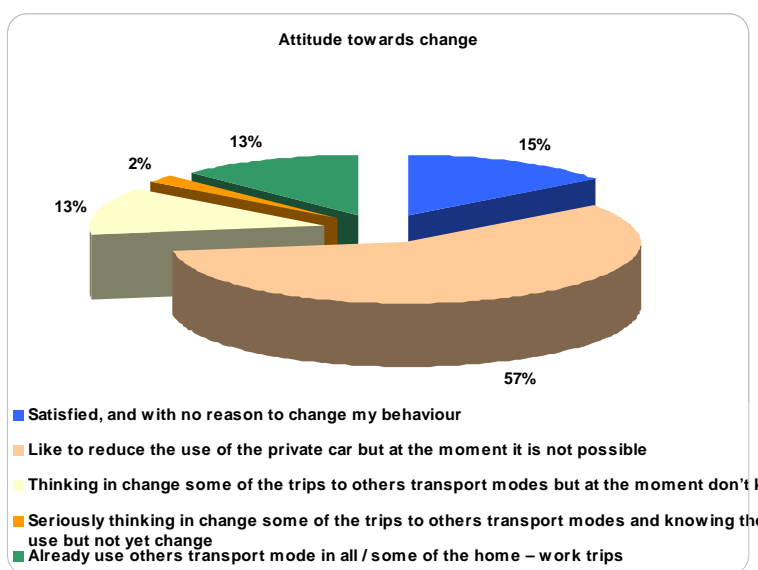


Figure C2.4.2 – Attitude toward change of the IPOC staff

C2.5 Society

To get an assessment about the acceptance and awareness – users towards the changes occurring due to the measure, specific questions was settled in the surveys to the workers of the IPO.

Table C2.5.1 – Indicator n.10 – ex-post values

Indicators and respective parameters	Ex-post values
Awareness (1 year/ Sept 11 – Aug 12)	96,3 %

Table C2.5.2 – Indicator n.11 – ex-post values

Indicators and respective parameters	Ex-post values
Acceptance – users (1 year /Sept 11 – Aug 12)	90,7 %

The table of results of the indicators is as follows:

Table 2.5.3 – Summary – Balance between society indicator (after/before and after/BAU)

Indicator	Before (date)	B-a-U (date)	After (date)	Difference: After –Before	Difference: After – B-a-U
10. Awareness	0% (1 year / Jul 10 – Jun 11)	0% (1 year / Sept 11 – Aug 12)	96,3 % (1 year / Sept 11 – Aug 12)	96,3 %	96,3 %
11. Acceptance - users	0% (Sept 11 – Aug 12)	66,7 (1 year / Sept 11 – Aug 12)	90,7 % (1 year / Sept 11 – Aug 12)	90,7 %	24 %

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	To provide at least 1 mobility plan for 1 Hospital and mobility actions for other 2 hospitals, as well as 1 partnership with 1 enterprise. A mobility plan for the IPOC hospital in Coimbra has been provided and mobility actions continue to be implemented in the other 2 hospitals involved in the measure. Two partnership for PT special services has been implemented, exceeding in this part the initial objectives.	**
2	To make mobility campaigns, with special attention to the young students, including organising a “Bus-Paper” and visits to SMTUC by students from municipality primary schools. Several mobility campaigns took place, including 3 campaigns directed to the IPOC hospital, 3 public presentations of the measure and an international workshop focused in this area organised in Coimbra. A “Bus-Paper”, a kind of Pedi-paper but also travelling by public transport, has been organised for the children, as well as 52 visits of young students to SMTUC (61 classes from 17 elementary schools, in a total of 1.154 children and 116 teachers and chaperones.	**
3	To improve 1% the municipality PT passengers that were workers at the hospital in Coimbra where the mobility plan has been implemented. The PT passengers that were workers at the IPOC hospital increased 24,0% due the measure implementation.	***
4	To decrease by 5% to 10% the use of private cars of the workers at the Hospital in Coimbra where the mobility plan has been implemented. The private car use of the workers of IPOC hospital decreased 10,3% due the measure implementation.	**
5	To improve the cooperation between SMTUC and Hospitals, University and Municipality. The cooperation has been improved namely by the support of the Municipality in the release of the mobility plan, the implementation of the mobility plan and mobility management action in hospitals, as well as the partnership with University workers for tickets discounts in the Park & Ride system and with the Nursing School for the special prices and dedicated transport for the students.	**
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full *** = Exceeded		

C4 Up-scaling of results

This measure was implemented for the 934 workers of the IPO hospital and it induced a 6,6% modal shift from private car to public transport – bus (Ex-post – BAU scenario) in the first year, creating a positive impact in the balance between the operating revenues and costs (+12.383 €) and economies in terms of reductions of energy use (-380.407 MJ) and emissions(-273 ton CO2 emissions).

If the measure was applied to a larger scale, namely the 2 other hospital of the health cluster (Children's and University Hospital) the impacts will be more important taking into attention that the number of workers to be involved in the mobility plans will be higher (5.100). So for instance the up-scaling for the 5.100 workers of these hospitals will represent an expected gain of 67.616 € per year and savings per year of 2.077.169 MJ in the energy consumption and 1.491 ton in the CO2 emissions.

C5 Appraisal of evaluation approach

The evaluation strategy of this measure sought to focus on a number of indicators across the areas of economy, energy, environment, transport and society, which were to be measured in different ways.

The evaluation strategy that based the Local Evaluation Plan (LEP) was defined a long time before the final definition of the measure and during the LEP elaboration the hypothesis considered in relation to the foreseen evaluation approach of the measure was very different from the approach that actually was taken.

The evaluation strategy of the indicators in the area of Energy and Environment and the definition of relevant data to the indicators in the area of Economy and Transport was based on both the revenues and costs given by the SMTUC management and the information obtained in two surveys focused to the IPO hospital workers. These surveys were taken in different periods: before the implementation of the measure - July 2011 and after the implementation of the measure - September 2012. The surveys allowed the assessment to the evolution of the modal split and the subsequent transfer between modes.

Thus, the referred change in the modal split (private car to public transport – SMTUC bus) induces benefits in terms economy, energy use and related emissions of Green House Gases.

The elimination of the indicator related to the Acceptance level of the PT operators has been decided due the change of the entities involved in the mobility plans implementation. In the final plan for the measure implementation has been decided to apply the mobility plans in 3 hospitals located in a health cluster that is served only by SMTUC, that is the responsible for the measure implementation. So didn't made sense to carry out a survey on measure acceptance by interviewing the measure responsible himself.

C6 Summary of evaluation results

The key results are as follows:

- **Modal shift from private car to public transport** – As a result of the measure implementation it was verified an increase of 10,3% in the transport public use by the workers of the hospital where the mobility plan has been implemented. The private car usage of these workers decreased 24% due to the passengers transfer from private car to public transport.
- **Increase of operating revenues** –The measure induced a 28% increase of the average operating revenues related to the workers of the hospital that transferred to public transport (+0,007 €/pkm), The increase of the operating revenues (ex-post – BAU) during the first year after measure implementation (13.162 €) were higher than the equivalent operating costs (779€) and the initial investment (18.670 €) could be paid back in 2 years.
- **Contribution to energy efficiency in the city** – The implementation of the measure would result in significant energy savings (-15,1%) due to the assessed significant reduction of the energy consumption per passenger (-0,31 MJ/pkm).
- **Mitigation of CO2 emissions** – As result of the increase of public transport usage, the implementation of the measure would result in relevant CO2 emission savings (-12,89 g/pkm) that corresponded to 273 ton CO2 savings during the first year of mobility plan implementation.

C7 Future activities relating to the measure

The development and implementation of travel plans and mobility management actions in Coimbra has catalysed a change in mentalities in planning technicians and local decision-makers. After many decades focused on traffic management activities, Coimbra now acknowledges that mobility management solutions, especially travel plans, is a practical and valuable way of dealing with the city mobility challenges.

The board of Administration of the University hospital has recently sanctioned the development of a travel plan to implement in the upcoming year. The city of Coimbra will also continue pressing the Paediatric hospital to implement a travel plan in the near future, rather than just implement isolated initiatives and actions. Also, there is a commitment on the part of the major stakeholders to follow-up the existing travel plan, namely by developing a plan for hospital out patients and logistic services. The travel plan has a four year implementation period which guarantees the involvement of the different partners in the upcoming years.

Also, city officials have indicated that the development and implementation of site-based travel plans is a very viable option in the future for applying in the University campuses and local secondary schools. Other mobility management actions will also be applied in the future in managing mobility during large events, such as sports and entertainment events.

D Process Evaluation Findings

D.1 Deviations from the original plan

The deviations from the original plan comprised:

- **Development and implementation of only one of the foreseen mobility plans**– Initially the city of Coimbra intended to develop three mobility plans (i.e., travel plans). The municipality had indicated three different sites – 2 hospitals and 1 university campus. However, due to the distance between these three facilities and to the different functions they carried out, SMTUC proposed the development of three plans for the city’s health cluster. This would allow for the optimisation of the work by developing travel plans for three hospitals which are all located in the northern part of the city – University Hospital, Oncological Hospital and Paediatric Hospital. The three hospitals were contacted and agreed to participate with SMTUC in the development and implementation of the travel plans. However, after several meetings with the Hospital Administrations the process only went forward in the Oncological Hospital. The other two hospitals delayed their participation due to the newly instituted national legislation that merged the Administration of the two entities. The merger process was prolonged throughout several months and accordingly the Board members did not want to commit with the plans while the issue was not totally resolved. On April 2011 a new Chairman for the joint hospitals was appointed but the resignation of the Portuguese Government delayed again this process. After the conclusion of the merger process on final December 2011 the hospitals finally acquiesced to developing and implementing the travel plans. Nevertheless, in the former months the attention of the decision makers of the joint hospitals has been centred in the hospitals restructuring tasks and in the management of the financial constraints imposed on the Portuguese public sector, pushing the mobility issues to a less priority level. These problems have delayed again the development and implementation of the travel plans in these two hospitals. For these reasons the measure is required to be extended to have a longer period for the evaluation of the impacts of the mobility plan implemented in the 1st Hospital involved in the measure and to have time to launch additional mobility management actions in the other 2 hospitals that delayed their involvement.

D.2 Barriers and drivers

D.2.1 Barriers

Preparation phase

- **Barrier 1.1 – Political / Strategic Barrier** – Lack of know-how and experience in Mobility Management at the National level required key measures personnel to spend more time in training and knowledge acquisition than initially foreseen for the preparation phase, delaying the start of the measure implementation;
- **Barrier 1.2 – Institutional Barrier** – There is no legal requirement in Portugal for public entities to develop travel plans, namely entities which are large traffic-generators. The lack of a legislative framework contributes to the lack of appreciation of the importance of mobility management actions.

Implementation phase

- **Barrier 2.1 – Technological Barrier** – The lack of a planning culture focused on mobility management hindered the process in the initial stages. Key stakeholders and decision-makers revealed some hesitation in developing travel plans as a means of dealing with the mobility problems in the city.
- **Barrier 2.2 – Problem Related Barriers** – A lack of a culture focusing on mobility management and a long process of junction and restructuration on 2 of the 3 hospitals involved in the mobility plans occurred. This fact contributed significantly to the delay in the development and implementation of the travel plans.

Operation phase

- **Barrier 3.1 – Financial Barrier** - Due to the financial crisis, many of the measures and actions foreseen in the mobility plans have been delayed. The fact that the travel plans involve three public entities (i.e., Hospitals, Municipality, and Municipal PT Operator) has led to a substantial decrease in the budget allocations for the travel plans, since the national government has severely curtailed funding and tender procedures.
- **Barrier 3.1 – Organisational Barrier** – The staff at the hospitals was also unaware of the implications of implementing travel plans and were not prepared to assume many of the activities involved, such as being mobility managers.

D.2.2 Drivers

Preparation phase

- **Driver 1.1 – Institutional Driver** – Availability of training sessions on mobility management and of mobility managing planning tools allowed for the surpassing the lack of knowledge of the personnel involved in the managing of the measure and the experience acquired with the mobility actions in the first hospital will allow for quicker implementation in the next hospitals involved in this measure.

Implementation phase

- **Driver 2.1 – Cultural Driver** – The team involved in the mobility management actions was highly motivated and interested, especially in the training tasks, and allowed for the recovery of the delay verified.

Operation phase

- **Driver 3.1 – Political / strategic Driver** – The great success of the initial mobility actions in the first hospital served as a catalyst for augmenting the interest for these activities in other entities.

D.2.3 Activities

Preparation phase

- **Activities 1 – Technological Activities** – Taking into consideration the lack of knowledge of SMTUC technicians about mobility management (barrier 1.1) and the availability of training sessions (driver 1.1), SMTUC sent its technicians to several training sessions and workshops to consolidate their knowledge on developing mobility plans.
- **Activity 2 – Involvement activities** – To combat the lack of a legal requirement in Portugal for entities large traffic-generators to develop travel plans (barrier 1.2) and with the objective to provide the legislative framework for the effect, SMTUC technicians (and other experts involved in the CIVITAS MODERN project) participated in meetings and work sessions with IMTT, the Portuguese Institute of Mobility and Inland Transport. A guidebook on mobility management and documents with the proposals for the legal requirement has been released by IMTT.

Implementation phase

- **Activities 3 – Institutional Activities** – In order to convince the hospital administrations that implementing a travel plan would be beneficial to the institution (barrier 2.1), SMTUC carried out a series of promotional campaign in the hospital and organised several meeting with the hospital administration (especially at the Oncological Hospital) to demonstrate the numerous advantages of having a travel plan.
- **Activity 4 – Involvement activities** – Also the great motivation of the team responsible for the mobility management (driver 2.2) allowed a constant pressing to demand replies and decisions from 2 of 3 hospitals involved in the mobility plans implementation and that was delaying the participation due to a complicated process of junction and restructuration of these hospitals (barrier 2.2).

Operation phase

- **Activities 5 – Political / Strategic** – The implementation of the travel plan at the Oncological Hospital of Coimbra marked the implementation of the first travel plan officially implemented in a Portuguese public hospital (driver 3.1). The social and media coverage the initiative has received, especially at the local level, has led to an increased interest in site-based travel plans, particularly on the part of the municipality, helping to make the entities more aware of the advantages of the mobility plans despite the financial crisis (barrier 3.1). The presentation of the Coimbra case at national level, namely in initiatives with IMTT, also contributed to a gradual change of mentalities.
- **Activity 6 – Involvement activities** – Great part of the activities that usually could be appointed to the mobility managers in the entities has been carried out by the SMTUC team involved in the mobility management, to avoid risks caused by the less preparation or motivation to assume these functions by some of them (barrier3.2).

D.3 Participation

D.3.1 Measure partners

- **Measure partner 1 – Serviços Municipalizados de Transportes Urbanos de Coimbra (SMTUC); Public transport company; Leading role**

SMTUC was responsible for the coordination of the activities of the measure, the work of research, knowledge acquisition, planning, and development of the travel plans. SMTUC is also an equal partner in the implementation of the plans (throughout their four year implementation period).

Besides developing the plans and coordinating its activities, SMTUC has invested in the Hospital by placing real time information panels in the hospital lobbies, developing and introducing tailor-made travel information for hospital staff and outpatients implemented a car-pooling system for hospital employees, etc.

The data collection regarding the evaluation was also carried out by SMTUC.

- **Measure partner 2 – Câmara Municipal de Coimbra (CMC); City; Principle participant**

The Municipality carried out the initial State of the art study and terms of reference for the development of the different travel plans.

Since October 2011 the Municipality has also been responsible for the dissemination of the CIVITAS MODERN project of Coimbra.

- **Measure partner 3 – Prodeso Ensino Profissional, Lda (PRODESO); High school; Principle participant**

PRODESO was responsible for the dissemination activities for the first three years of the MODERN project of COIMBRA.

- **Measure partner 4 – Perform Energia, Lda (PE); Private company; Principle participant**

PE was the partner responsible for the evaluation of this measure, namely analysing data and results.

D.3.2 Stakeholders

- **Stakeholder 1 – General Public** – The general public will benefit from the implementation of the travel plans for two main reasons. The first will be due to the improvement in general mobility of the northern part of the city when all the hospitals have totally implemented the travel plans. The second major benefit results from the introduction of a new paradigm in approaching mobility issues in Coimbra, namely through mobility management techniques and methods.
- **Stakeholder 2 – Public Hospital in Coimbra** – The successful implementation of the travel plans will contribute to improving the hospital corporate image and resolve some of the severe traffic problems caused by these institutions in the Cities overall mobility.

- **Stakeholder 3 – Hospital Employees** – These professionals will be the ones who benefit the most from the travel plans since they are now aware of the different options available to them for the daily trips.
- **Stakeholder 4 – Municipality of Coimbra** – The participation in the development of Travel Plans opened up a new opportunity for the municipality to try to implement a new approach to solving its mobility problems – i.e., mobility management.
- **Stakeholder 5 – SMTUC** – The participation in the development of Travel Plans opened up a new opportunity for SMTUC to implement a new approach to solving its mobility issues and improve the PT services of the city – i.e., mobility management.
- **Stakeholder 6 – National mobility entities** – The official implementation of a travel plan in a large public institution is in the interest of national institutions, such as the Portuguese Institute for Mobility and Inland Transportation, because it allows for the incremental introduction of mobility management approaches.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- **Cultural resistance to travel plans** – The resistance to travel plans results from a culture heavily focused on traffic management. The implementation of travel plans in countries with this type of culture implies intensive promotional campaigns to demonstrate the advantages of implementing mobility plans.
- **Commit stakeholders** – To achieve the desired results, the principal stakeholders must be committed with the development and implementation of the travel plans. Technical and financial issues should be perfectly explained to all the agents involved so that they know what to expect throughout the whole period of development and implementation.
- **Involve target group** – To involve people on the acceptance of the mobility management actions and avoid its indifference related to these issues it is important to have a relatively short gap between the announcement of the intentions and the beginning of the implementation. Case contrary people will have doubts about the really implementation of the plan. A good approach, that has been used in Coimbra case, could be the anticipated launch of the more simple measures (but identified as having important impact in the target group).

D.4.2 Recommendations: process

- **Communicate clearly and constantly** – The success of the travel plan depends on efficient communication activities, which involve stakeholders in every stage of the process. If people are not informed and do not feel they are part of the process the results may not be satisfactory.

ANNEX 1 Fuel Mix Data

The next table shows the data obtained in relation to the evolution of the Share of different fuels (diesel, gasoline) in the Fuel consumption in Portugal since 2004:

Year	2004	2005	2006	2007
% Diesel	71,1%	72,2%	73,0%	74,5%
% Gasoline	28,6%	27,4%	26,6%	25,2%
% GPL	0,3%	0,3%	0,3%	0,4%

ANNEX 2 Energy Density and Conversion Factors

Energy Density			
1 litre Diesel	35,86 MJ	1 litre Diesel	0,835 kg
1 litre Gasoline	32,18 MJ	1 litre Gasoline	0,7475 kg

ANNEX 3 Load Factors in Transport

Unit: passengers per vehicle or tonnes per vehicle

Load factors (road)	Car (passengers)	Bus (passengers)	LDV (tonnes)	HDV (tonnes)
Austria	1.48	30.0	0.30	9.8
Belgium	1.46	11.6	0.30	5.0
Denmark	1.86	20.0	0.30	8.9
Finland	1.40	12.9	0.30	6.2
France	1.86	18.5	0.30	4.6
Germany	1.44	18.5	0.30	4.6
Greece	1.98	10.7	0.30	7.4
Ireland	1.71	8.5	0.30	7.3
Italy	1.88	16.9	0.30	5.5
Luxembourg	1.60	17.7	0.30	6.8
Netherlands	1.63	22.2	0.30	7.5
Norway	1.81	11.3	0.30	5.6
Portugal	2.46	27.7	0.30	3.9
Spain	2.02	25.2	0.30	5.6
Sweden	1.64	13.2	0.30	4.7
Switzerland	1.67	18.7	0.30	5.6
UK	1.66	8.9	0.30	6.9
Total	1.74	17.2	0.30	5.62

Source: Infras, 2000.

ANNEX 4 Emission Factors

Table 4-18: Bulk emission factors (g/kg fuel) for Portugal, year 2005.

Category	Portugal					
	CO	NO _x	NMVOG	CH ₄	PM	CO ₂ [kg/kg fuel]
Gasoline PC	61.56	9.18	8.50	0.71	0.03	3.18
Diesel PC	3.20	11.28	0.57	0.04	0.72	3.14
Gasoline LDV						
Diesel LDV	9.39	17.91	1.72	0.11	2.05	3.14
Diesel HDV	7.14	34.09	1.14	0.24	1.04	3.14
Buses	11.88	40.75	4.18	0.31	1.85	3.14
Mopeds	403.89	3.62	360.25	6.55	6.32	3.18
Motorcycles	590.71	5.89	128.94	4.57	2.80	3.18

ANNEX 5 Calculus

GENERAL DATA			
1. Average number of trips per day	3,5	Year 2007 - Details : Annex 1	
2. Average distance per passenger (km)	3,563	Fuel Mix - Gasoline	25% FMG
3. Working days per year	240	Fuel Mix - Diesel	74% FMD
4. Calorific Power Gasoline (MJ/l)	32,18		
5. Calorific Power Diesel (MJ/l)	35,86		

	Notes	Scenario	Ex-Ante	BAU	EX-Post
A BUS (SMTUC) Baseline - 13,8%	A1	Average Consumption (l/100km) -	50,5	50,5	50,5
	B1	Workers (per day) -	129	215	267
	C1	Passengers per year C1 = 1. x 3. x B1	108.269	180.914	224.500
	D1	Load Factor (passengers per vehicle) -	16,4	16,4	16,4
	E1	Passenger. km (p.km) E1 = C1 x 2.	385.763	644.596	799.895
	F1	Distance (km) F1 = E/D	23.522	39.305	48.774
	G1	Consumption per year (litres) G1 = A x F1 / 100	11.879	19.849	24.631
	H1	Energy Consumption (MJ) H1 = G x 4.	425.970	711.779	883.264
B PRIVATE CAR Baseline - 63,3%	A2	Average Consumption (l/100km) -	9,2	9,2	9,2
	B2	Workers (per day) -	591	505	453
	C2	Passengers per year C2 = 1. x 3. x B2	496.626	423.982	380.395
	D2	Load Factor (passengers per vehicle) -	1,3	1,3	1,3
	E2	Passenger. km (p.km) E2 = C2 x 2.	1.769.480	1.510.648	1.355.349
	F2	Distance (km) F2 = E2/D2	1.361.139	1.162.037	1.042.576
	G2	Consumption per year (litres) G2 = A2 x F2 / 100	124.544	106.326	95.396
	H2	Energy Consumption (MJ) H2 = G2 x (4.xFMG + 5.xFMD)	4.334.359	3.700.347	3.319.940
TOTAL (A+B) BUS + PRIVATE CAR	B3	Workers (per day) B3 = B1+B2	720	720	720
	C3	Passengers per year C3 = C1+C2	2069	1767	1585
	E3	Passenger. km (p.km) E3 = E1 + E2	1769480	1510648	1355349
	F3	Distance (km) F3 = F1 + F2	1.361.139	1.162.037	1.042.576
	G3	Consumption per year (litres) G3 = G1 + G2	124.544	106.326	95.396
	H3	Energy Consumption (MJ) H3 = H1 + H2	4.334.359	3.700.347	3.319.940
		Consumption (MJ/pkm)	2,21	2,05	1,95

MODAL SPLIT CALCULUS

	Scenario	Ex-Ante	BAU	EX-Post
Passengers.km	Total Passengers.km	2.347.744	2.347.744	2.347.744
	BUS SMTUC	385.763	644.596	799.895
	Private Car	1.769.480	1.510.648	1.355.349
	Other modes	192.501	192.501	192.501
Modal split passengers.km	Total Passengers			
	BUS SMTUC	16,4%	27,5%	34,1%
	Private Car	75,4%	64,3%	57,7%
	Other modes	8,2%	8,2%	8,2%

ANNEX 6 Structure and questions of the IPOC Hospital Workers Survey

As agreed with the IPOC hospital administration the universe of the surveys has been all the 934 workers of the hospital since has been considered not recommended to select specific workers due the characteristic of some functions. The hospital didn't want to select and oblige appointed workers to fill the survey. The survey has been distributed to all workers by hospital intranet and during 2 days mobility coordinator and measure leader attended the hospital to provide explanation and ask to questions.

1st SURVEY - 7 – 22 July 2011

This first survey was made before the implementation of the measure and the main objective was to evaluate the mobility of their workers before the implementation of the measure.

The survey is structured in two mains sections. The section A includes 9 questions related with personal data of the worker , namely the questions related to the residence local, sex, age (<25, 25-34, 35-44, 45-55, >55), function/category, health problem or physique constraint that condition the choice of displacement to the work and what kind of constraint, working timetable, day of the week that usually work and timetable period of the day.

The section B includes 5 questions concerning the characteristics of the trips to work mainly the distance, the time of the voyage, the transport mode, the number of transfer and reasons of use the private car in the home-work trips.

SECCTION A – PERSONAL DATA
A1. Local of residence
A2. Sex
A3. Age (<25, 25-34, 35-44, 45-55, >55)
A4. Function /Category (leader , doctor, technician, nurse, diagnostic an therapeutic, technical assistant, operational assistant, other)
A5. Health problem or physique constraint that condition the choice of trip to the work (Yes / No)
A6. Type of handicap (blind, reduce mobility, other)
A7. Working time table (full time, part – time, flexible timetable, fix timetable, working shifts, weekend, nights)
A8. Working days of the week (Monday, Thursday, Wednesday, Tuesday, Friday , Saturday, Sunday)
A9. Normal working timetable (from /to)
SECTION B – TRIP TO WORK
B10. Distance to go to work (till 1 km, 1-2 km, 2-4 km, 4- 10 km , more than 10 km)
B11. Actually time of trip to go to work in minutes (0-15, 16-30, 31-45, 46-60, more than 60)
B12. Usual mode of transport to go to work (private car conductor, passenger private car, bicycle, walking, taxi, bus, train, motorcycle, other)
B13. Number of transfer

B14. Reasons of use the private car in the home-work trips (satisfied, and with no reason to change my behaviour, like to reduce the use of the private car but at the moment it is not possible, thinking in change some of the trips to others transport modes but at the moment don't know how to do it, seriously thinking in change some of the trips to others transport modes and knowing the alternatives to use but not yet change) Already use others transport mode in all / some of the home – work trips

Regarding the questionnaires, the gender is divided into 14,5% of men and 85,5% of women.

In terms of demographics, the main results have been achieved in the age intervals of 25-34 and 35-44 with results of 27,7% and 36,1%, respectively. Under 25 years of age, only 3% have responded affirmatively. In the other intervals, the results obtained are near 20% for the 45-55 and over 10% for the >55.

Concerning respondents occupation, the assistant technician (15.6%) and the technical operational (22.5%) categories provided over 35% of all the answers. On the other hand, the results of the senior technicians and doctors were the lowest of all, registering under 10%. In the other categories the results shows around 10% of the responses, namely the nurses (14.4%) and lab technician staff (8%). The leadership categorie registered the smallest contribution with only 4%.

2nd SURVEY - 10 – 20 Set 2012

The second survey was also addressed to the workers of the IPOC hospital and the main objective was to evaluate the Mobility Plan and the mobility behaviour of their workers.

The survey was equal to the first survey, to allow comparison of data. Only has been added some specific questions to assess the modal shift between the 2 stages (ex-ante – ex-post) and the reasons for these changes (allowing also the assess to the BAU values and the sequent impacts of the measure).

The survey was also structured in two main sections, like the first survey.

The section A includes the same 9 questions related with personal data of the worker , namely the questions related to the residence local, sex, age (<25, 25-34, 35-44, 45-55, >55), function/category, health problem or physique constraint that condition the choice of displacement to the work and what kind of constraint, working timetable, day of the week that usually work and timetable period of the day.

The section B includes 8 questions concerning the characteristics of the displacement to work mainly the distance, the time of the voyage, the transport mode, the number of transfer, if using private car share with another passenger, if after July 2011 had change the mode of transport and what was the mode used.

The last two questions of this section are related with the measures implemented in the SanusMobilis Mobility Plan and with the reasons of using the private car in the home – work trips.

SECTION A – PERSONAL DATA
A1. Local of residence
A2. Sex
A3. Age (<25, 25-34, 35-44, 45-55, >55)
A4. Function /Category (leader , doctor, technician, nurse, diagnostic a therapeutic, technical assistant, operational assistant, other)
A5. Health problem or physique constraint that condition the choice of trip to the work (Yes / No)
A6. Type of handicap (blind, reduce mobility, other)
A7. Working time table (full time, part – time, flexible timetable, fix timetable, working shifts, weekend, nights)
A8. Working days of the week (Monday, Thursday, Wednesday, Tuesday, Friday , Saturday, Sunday)
A9. Normal working timetable (from /to)
SECCTION B – TRIP TO WORK
B10. Distance to go to work (till 1 km, 1-2 km, 2-4 km, 4- 10 km , more than 10 km)
B11. Actually time of trip to go to work in minutes (0-15, 16-30, 31-45, 46-60, more than 60)
B12. Usual mode of transport to go to work (private car conductor, passenger private car, bicycle, walking, taxi, bus, train, motorcycle, other)
B13. Number of transfer
B14. Share of private car (Yes/ No)
B15. Mode of transport used till July 2011 if changed after that date (driving private car alone, driving private car with an occupant, private car passenger, bicycle, walking, taxi, bus, train, motorcycle, other)
B16. Measures of the SanusMobilis Plan that had influence in the change of the used transport mode (installation in hospital of the public transport real time information, improve of quality of the public transport, development of carpooling programme to the workers, signature of the discount protocol in the park & ride services to the collaborators, campaigns of public transport promotion and other alternative modes of sustainable mobility, support of the mobility management, other actions))
B17. Reasons of use the private car in the home-work trips (satisfied, and with no reason to change my behaviour, like to reduce the use of the private car but at the moment it is not possible, thinking in change some of the trips to other transport modes but at the moment don't know how to do it, seriously thinking in change some of the trips to others transport modes and knowing the alternatives to use but not yet change). Already use others transport mode in all / some of the home – work trips

Regarding the questionnaires, the gender is divided into 41% of men and 59% of women.

In terms of demographics, the main results have been achieved in the age intervals of 35-44 and 45-55 with results of 31% and 30%, respectively. Under 25 years of age, only 4% have responded affirmatively. In the other intervals, the results obtained are near 20%.

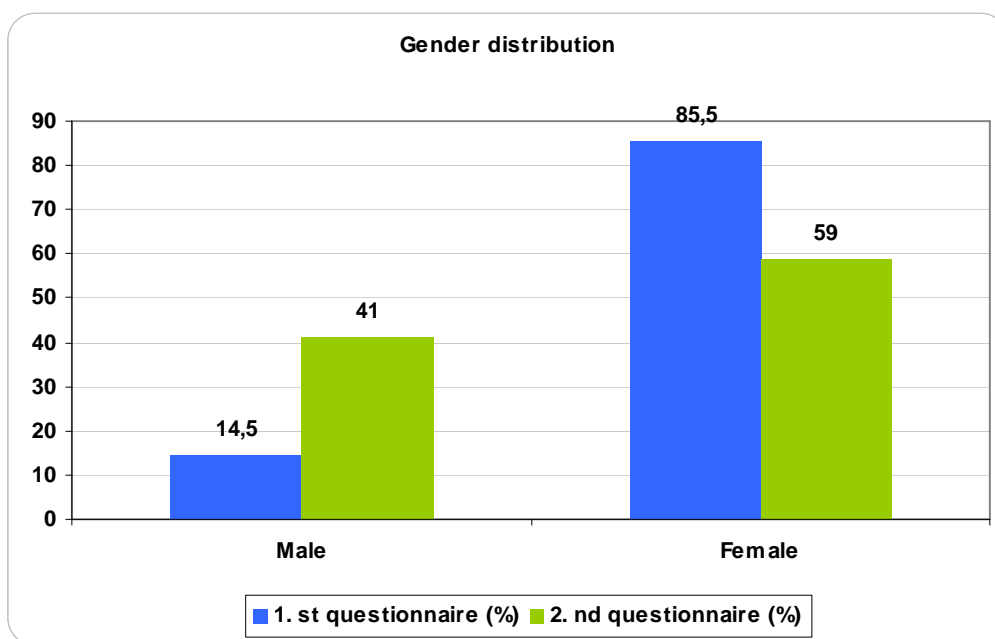
Concerning respondents occupation, the assistant technician and the technical operational categories provided 25% and 20% of the answers. On the other hand, the results of the senior technicians and doctors were the lowest of all, registering under 10%. In the other categories the results shows around 10% of the responses, namely the nurses and lab technician staff.

SURVEYS CAMPARISON

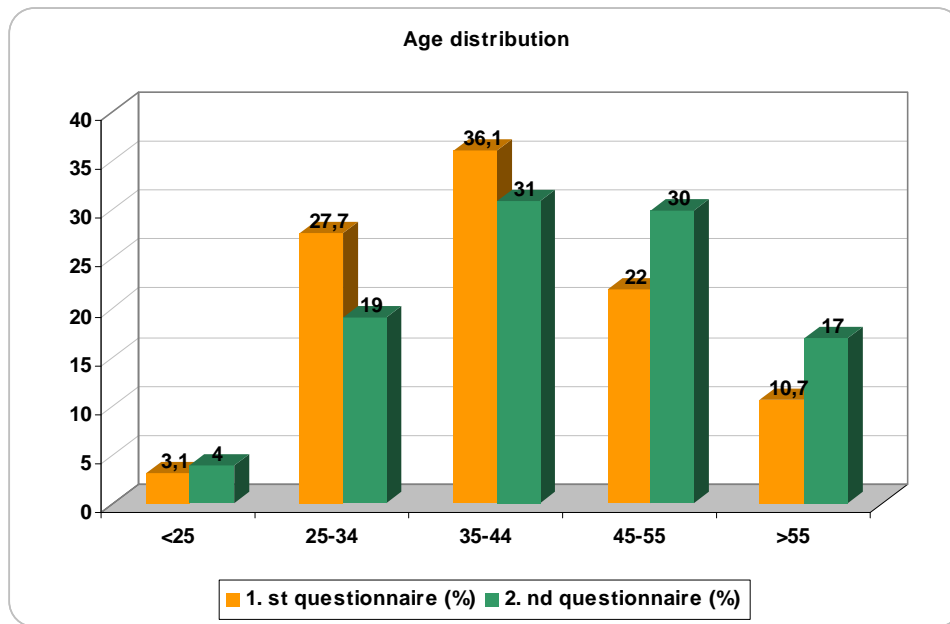
The first survey had 159 respondents and the second survey had also the universe of the IPOC hospital workers but only with 54 respondents.

The reason for the decrease in the respondents has been the complicated period that IPOC workers carried out together with the remaining Portuguese population due the financial crisis. Some austerity measure involving the health sector has been proclaimed and people were more concerned with their personal problems than with the mobility issues.

Regarding the gender distribution, highlight for increase with over 20% male, in the responses from first to the second questionnaire. On the other and, the results for the female responses decreased over 25%. Thus, in the second survey there was a more balanced distribution of answers.



Concerning the age distribution, the level of respondents was very similar, with only minor variations in the age group of 25-34 and 45-55, with more than 8% variation between surveys. Meanwhile, in the age groups of 35-44 and < 55 the variation was about 5% and finally at the age group of >25 it registered the smallest variation. So, this characteristic has not registered a significant variation between the two surveys.



In terms of occupation, it has been registered a response enlargement in the leadership class and the assistant technician with over 5% and 95, respectively. In the other groups there was a slight decrease in the responses of about 4%, highlighting the doctor groups with 6% decrease.

