6. OVERVIEW OF EVALUATION IN KRAKOW

6.1 Krakow: City Description

Krakow is placed in the Southern part of Poland on the Vistula River in a valley at the foot of the Carpathian Plateau, 219 metres above sea level. Approx. 300 km to the North lays Warsaw, the capital of Poland, and 100 km South are the Tatra Mountains, forming the Southern border of the country. The city covers an area of 327 km², equalling 0.1% of the country’s surface area.

With almost 800,000 inhabitants, Krakow is one of the biggest cities in Poland. The old part of town has a unique historic character and the city is a prominent centre of culture, science, a university city, where the economic activity is very strong and tourism growing. Krakow was under the first cities to be enlisted to the World Natural and Cultural Heritage and in the year 2000 Krakow was “cultural capital” of Europe.

The main functions of the city are:

- Education, with about 140,000 students at “Jagiellonian University”, the oldest university in Central and Eastern Europe;
- Industry, including the metallurgical, steel, chemical, food, clothing and printing industries. For several years radical restructuring of Krakow’s industry has been taking place aiming to reduce environmental impact, to stimulate the transition to new more effective technologies and to decrease the cost of production. In Krakow’s “Special Economic Zone” the Centre for Advanced Technologies is located together with other selected companies;
- Services, especially tourism.

The mission in the strategy of city development is: reinforcement of the metropolitan functions of Krakow as a European centre of culture, arts, science, tourism, services and modern industry, as well as creation of conditions suitable for the continuous improvement of the quality of living of its residents.

The general transportation policy was laid down in a resolution of the City Council in 2003 and is compatible with the recommendations of the OECD/ECMT Project Group. The detailed elaboration of the policy of improvement and development of the transportation system for Krakow has been applied in the Master Plan of Krakow, approved by the City Council in 2005. The major goal of Krakow’s transport policy is to create conditions for efficient, safe, economic and environmentally friendly transport of passengers and goods. This policy needs comprehensive activities in the fields
of master planning, designing, operating and management, and investment. The key aim is the priority for urban transport in investment and operation of the transport system (i.e. bus lanes, tramway tracks and bus streets, transit-directed traffic control). Effective traffic control systems should provide priorities for public transport, keep or restore its time accuracy and regularity, control also the Park and Ride system, restrict car accessibility to the city centre and other sensitive areas, counteract against traffic congestion and establish a balance of the road network and the parking capacity, taking into consideration the changing traffic flows.

The goal for the urban public transport is to improve standards of its services and maximise the effectiveness of the existing system to make it competitive to the individual car. This is aimed to be achieved by upgrading facilities and rolling stock, co-ordinating time schedules and synchronisation, wide use of traffic priorities as well as dispatching control. There is also strong support for the development of bicycle paths to allow cyclists to use bicycles freely and safely. The most important initiative in the public transport domain is creating a new tramway line of a higher standard - the Fast Tram. The Krakow Master Plan 1994 recommended to build 43 km of new fast tramway tracks in the next 20 years. The option with trams on a rail network (the Karlsruhe model) is being investigated. Tram tracks represent a more natural and easier way of traffic segregation, the low sensitivity of trams to overload with passenger flows as well as “tradition” have influenced the decision in favour of the Fast Tramway network despite of the higher investment cost in comparison to a bus system. A metro system has been considered and rejected on account of the very high capital investment required. The Fast Tram service will be extended from the North to the South of Krakow, connecting huge housing estates, the commercial City centre with the main railway station and designated strategic development zones. The City Government has succeeded in negotiating a long term loan of approximately $40M for the project from the European Bank for Reconstruction and Development (EBRD). It is anticipated that the tram system will become the most popular means of public transport and a centre-piece of a public transport system. There is also planned implementation of Park and Ride system. There will be 19 locations of Park and Ride lots, situated close to the III and IV by-pass road. System will be connected mostly with fast tram.

6.2 Measures implemented

Measure 5.3 Transition towards clean vehicle fleets in Krakow

The transition for clean vehicles (those with much smaller impact on environment in comparison to standard cars) is based on the MPK’s policy of fleet gradual exchange focused on environment friendly vehicles. The policy assumes the withdrawal of the old generation buses (i.e. those equipped with engines constructed in 60’s) and their exchange into modern ones by the year 2008. In the meantime in order to limit the exhaust fumes emission the following activities have been being curried out: searching for special fuel components, installation of catalysers, searching for and use of new low-sulphur fuels as well as special care for technical condition of engine feed systems. MPK introduced first 5 CNG busses at the very beginning of the year 2007. The buses will operate on lines no 192, 492 (which lead to the airport) and line 134 (to ZOO). The following activates related to new buses testing will be curried out in whole year 2007. During the testing period real operational and exploitation measurements will be made. The gathered results will provide information necessary to decide about a purchase of further CNG vehicles (up to 15 buses in total).

Measure 6.1 Integrated access control strategy in Krakow

Krakow was one of the first cities in the country to implement severe access restrictions in inner-city areas. Krakow has equally implemented a comprehensive traffic restraint scheme in the city centre (A, B, C Zones). In the city centre of Krakow, three different types of access zones are currently in operation. Krakow will enlarge and implement a new access regime for its B-Zone. Main objective of this measure is to implement all ideas of "Project of changes of traffic rules in the city centre of Krakow". Main advantage of this concept is that it is already several years existing scheme and it is well known belong citizens. That means an opportunity to enlarge car restricted
zones (especially "B" zone) without changing in a very strong way current behaviours. Enlargement of the "B" zone will be done in a specific way, making possible at the same time to improve public transport conditions in the city centre.

**Measure 6.4 Enforcement of access restrictions in Krakow**

Krakow has equally implemented a comprehensive traffic restraint scheme in the city centre. However, the scheme is not sufficiently effective. In the city centre there are currently three different types of access zones in operation. Due to high level of traffic on 1st Ring Road in the city centre, illegal transit movement through the old city area states significant problem. There is no electronic system for verification operating. Within this measure the electronic access control will be demonstrated at one important gate to enter the city centre. It should help to decrease number of illegal entrances and transit moves.

**Measure 8.3 Clean high mobility corridor in Krakow**

The public transport operator in Krakow (MPK) has been very active in setting up new PT services, addressing institutional and commercial efficiency (e.g. MPK is a profit-making company). PT has the central role to ensure accessibility and both aim to increase the already high levels of public transport use. Closely integrated policies for clean vehicle use, passenger security, ticketing, institutional innovation, new flexible services aimed at bridging the gap between high-volume public transport and private car-based transport, and services addressing new demands in intermodal leisure-related mobility will be demonstrated. Important elements such as new type of bus/tram stops and use of CNG buses in the clean high mobility corridor will also be demonstrated.

**Measure 8.6 Demand-responsive transport services in Krakow**

Implementing irregular transport system by buses operating in Dial and Ride system will improve quality and accessibility of public transport in these areas of Krakow. The aim of this project is to launch and test a demand-responsive bus service in the areas of Rybitwy, Podwierzbie, Biezanow in the South-East side of Krakow, initially using 5 small buses. This service is characterised by flexible routes and schedules responding partially or fully to requests of individual passengers. For managing the demand-responsive system, Krakow will take-up the technology and software from the existing demand-responsive public transport service in Genoa. The first new buses in Demand-responsive technology will be tested on the lines 115 or 125- linking the new demand-responsive public transport service with the city centre. In this corridor, two major bus and tram stations at the crossroads Lubicz Street - Westerplatte Street on the 1st ring road will be converted into two "model" stations: The height of their platforms will be adjusted (making it level with the pavement), high quality information services and a sound information system for elderly people will be installed.

**Measure 8.8 New leisure related mobility services in Krakow**

Innovative bike carrying facilities will be installed on 12 buses. This should allow people to arrive at bicycle tours in recreation areas around Krakow. It is expected to achieve a 20% increase of PT use on these bus lines in the months April to October. The measure will be focused on testing bike carry facilities on the regular bus line no 134 – to Zoo in the scope of operating and functionality and evaluating bike users’ sensitivity - gaining their opinions and recognizing their feelings about testing bike carry facilities. MPK has purchased 32 small buses which are equipped with special holder making easier assembling bike carry facilities on buses.

**Measure 8.10 Integrated ticketing and tariffs in Krakow**

Integrated tariffs and ticketing are only available within the city area, on buses and trams of the PT operator MPK. There is no integrated ticketing between railway and other transport modes. Within this measure City of Krakow will perform test of an integrated ticketing and tariff solution between
local PT and national railway. With the integrated ticketing and tariff solution, an increase of public transport share on the corridor Krzeszowice-Krakow is expected.

**Measure 8.11 Security action plan for public transport in Krakow**

Within this measure, with strong interrelation to measure 8.3 "Clean high mobility corridor", a specific integrated public transport security concept will be developed in Krakow. The security audit will focus in the first place on tram stops on the 1st ring road, where travellers have to exist on the street. Security issues related to women will particularly be taken into account.

**Measure 9.2 Car pooling system in Krakow**

There is no official car-pooling system in Krakow. But it is well known between students of many universities, who exchange information about their trips, especially journey to their home cities. Also in group of students and workers of university, internet is well known and a recognized mean of exchanging information and data. So, initial implementation of data base including information about free places in private cars for shared use of cars will be done at Krakow University of Technology. Putting that information on main Krakow's internet site should make it more accessible also for people not connected with the University. In Krakow as in all Central European countries an alternative to the very strong trend of increasing car ownership (and its associated psychological attractions) especially for young people, will require to collect first experiences with car pooling, and only later move to a possibly innovative form of adapted car sharing in the CEE.

**Measure 9.5 Policy options for car sharing in Krakow**

The City of Krakow considers car sharing as a promising option for transport demand management in order to reduce the negative impacts of car traffic. Within this measure study of car sharing system in Krakow will be made, taking into consideration lessons and results of car pooling system, which is going to be developed by Technical University of Krakow (PK).

**Measure 9.7 Bicycle renting in Krakow**

Krakow has about 50 km long bike paths system. However the system is not well integrated. Bicycles have about 2% in total non-pedestrian trips in the city. The study of bike paths system has been developed and it is being implemented year by year. There are also "technical standards for Krakow bike system" well developed and agreed between all important participants and decision makers. Initial implementation of the free bicycle renting system in the city centre will be developed within this measure. It is planned to integrate bike renting facilities/places with bus/tram stops to have an integrated approach and to promote combined use of soft modes, especially within the historical city centre.

**Measure 10.3 New goods distribution scheme in Krakow**

The Market Square is congested and full of delivery vans during the time window 19-10 h, which effects in noise, air pollution and decrease of attractiveness of old city centre for tourists and inhabitants. In this measure, feasibility study (take-up of Genoa experience) concerning the system for the distribution of goods in the city centre of Krakow, using clean and energy efficient vehicles will be taken. The most important activity connected with this measure is to verify permission system for goods delivery to the city centre.

**Measure 11.3 Sustainable mobility marketing in Krakow**

Within this measure Krakow will develop an integrated marketing scheme for sustainable transport modes in Krakow. The integrated marketing scheme will include a series of activities to draw people's attention to the adverse impacts of traffic, to the existence of sustainable modes and their potential to fulfil individual mobility needs. It means organizing seminars and events, which focus on different issues of sustainable mobility. The city will use these events, in order to inform the
citizens and specific target groups about measures related to demand management and promotion of sustainable transport modes (as implemented within CIVITAS).

**Measure 11.7 Mobility Forum in Krakow**

The municipality of Krakow has a strong political commitment to improve the communication and the involvement of the public and important stakeholders in the decision-making process of transport planning activities. The Krakow Mobility Forum, which will work under the lead of the Mayor of Krakow, will be first official platform to test better communication and public involvement in process of transport system development.

**Measure 11.9 Integrated mobility plan for the Technical University of Krakow**

The integrated mobility plan for the Technical University of Krakow represents an innovation in our city. One tangible and pioneering outcome of this measure will be the creation of an institutional consultant of mobility, who could undertake strategic decisions about mobility initiatives and influence the target groups. Integrated mobility plan will be implemented at The Technical University of Krakow, it will be the most important instrument of mobility management. The position of an institutional consultant of mobility and new mobility information website will be created. The proposed activities are divided into two main groups:

- **Research activities**: developing the mobility plan for the Technical University of Krakow and designing all the single measures of the mobility plan, establishment of the institutional mobility consultant;
- **Demonstration activities**: Implementation of all the measures of the mobility plan for the Technical University of Krakow.

**Measure 11.16 Monitoring Centre for Road Safety and Accident Prevention in Krakow**

In Krakow, an overall concept for improving road safety and accident prevention does not yet exist. There is a system dealing with data collection about road incidents and accidents, which helps to define potential risks and how to improve road infrastructure according amount of accidents. Within this measure Krakow will set up a Monitoring Centre for Road Safety and Accident Prevention. The main objective is to develop a support system to implement operational plans to reduce accident risk in critical situations and to develop strategies to improve safety.

**Measure 12.3 Informobility platform in Krakow**

Today some information about tram and bus networks and timetables are available at MPK Internet site. It includes time tables for each of stops in both directions for each line. Planned actions in CARAVEL are development of internet information about public transport time tables with module for interchange at transfer points.

**Measure 12.6 Public transport priority system in Krakow**

Improvement of level of inhabitants’ life and increasing fashion on private car lead to larger motorisation of society. More and more number vehicles are reason for problems of streets capacities and parking spaces, what extorts continuous extension of street sections and necessity of search new forwarding corridors. This “vicious circle” is driven by extension of transportation infrastructure. The best way to solve this problem – is the creation a high standard passenger friendly public transport system. It will be possible with use privilege means for public transport vehicles in urban traffic, such as: separate lanes for trams and buses (also common bus-tram lanes), common stops and priorities in traffic lights.
## 6.3 Targets

<table>
<thead>
<tr>
<th>Quantitative Target (if present)</th>
<th>Qualitative Target (if present)</th>
<th>Verifiable results</th>
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</table>
| **5.3 Transition towards clean vehicle fleets in Krakow** | • Comparison of emission between CNG buses and diesel ones  
• Decreasing of operating costs | • Increase of PT passenger-km in CIVITAS area using clean vehicles  
• Comparison of operational efficiency levels for clean buses as for conventional vehicles  
• Relative reduction in CO2 emissions linked to PT  
• Improvement of the overall image of the PT services; |
| **6.1 Integrated access control strategy in Krakow** | • To achieve social consensus for integrative policy on use of scarce public space  
• To improve conditions of public transport in the city centre  
• To make city centre more attractive for non-motorised transport users  
• To better promote in mass media the policy about car mobility restrictions | • extension of restricted traffic area by 30% and 5 km of roads  
• reduction of car traffic by 5% in “B-zone” in Krakow  
• elimination of 500 on-street parking places (to be updated in the detailed final project)  
• improvement of trip conditions for pedestrians |
| **6.4 Enforcement of access restrictions in Krakow** | • Implementing and test of an electronic identification system  
• Decreasing the amount of cars getting into restricted area without permission  
• Elimination of traffic passing the old centre city  
• Improvement of the environmental conditions in city | • decrease of about 20% transit traffic through old city centre  
• improvement of traffic conditions for public transport vehicles  
• lowering costs of running the control system by 5% |
| **8.3 Clean high mobility corridor in Krakow** | • implementing two tram stations with “model” character in terms of accessibility, safety and information provision at these corridors  
• realising a comprehensive strategy to improve PT security and safety (including speed reduction near PT stops)  
• improving PT infrastructure in the city centre, especially for elders and disable people (i.e. adjusting the height of platforms, improving information provision) and reduce passenger boarding and alighting time | • lowering a factor of accidents by 25% on the 2 “model” stops  
• increase in user satisfaction by 35%  
• improved road side air quality |
| 8.6 Demand-responsive transport services in Krakow | • Enlargement of PT offer by implementing the first demand responsive transport service in Poland  
• Testing of demand-responsive lines in the areas suburban of Rybitw, Podwierzbie and Biezanow in South - East Krakow, 5 small buses will be used to run the system  
• Launch of the management and control centre for the demand responsive system Introduction of a new phone number to make system available for all users | • Institutionally integrate this efficient flexible PT service tailored to individual passengers needs: | • Reduce operator costs by substituting infrequent, high-volume services in low-density areas |
| --- | --- | --- | --- |
| 8.8 New leisure related mobility services in Krakow | • Number of bike-bus users on the corridor to the recreation area on weekends from April to October | • social acceptance of the measures and social impact and implications. | • bike-bus users on the corridor to the recreation area on weekends from April to October  
• installing Innovative bike carry facilities on 12 buses  
• marketing the service (with information brochure)  
• testing the system for future implementation from suburbs areas into the city centre |
| 8.10 Integrated ticketing and tariffs in Krakow | • Increasing of PT share by 10% (in Krzeszowice-Krakow corridor)  
• Testing the solution of an integrated ticketing and tariff between local public transport and the National Railway line in the corridor Krzeszowice-Krakow  
• Decreasing amount of private cars getting into the city (people from outside the Krakow going to- and from- the work) | • Improving the quality of passenger trips in the wide-city areas | • 10% more rail passengers in Krzeszowice – Krakow corridor  
• 10% new passangers of MPK buses  
• 5% decrease of car traffic on road Krzeszowice – Krakow |
| 8.11 Security action plan for public transport in Krakow | • implementing two tram stations with “model” character in terms of accessibility, safety and information provision at these corridors  
• realising a comprehensive strategy to improve PT security and safety (including speed reduction near PT stops)  
• improving PT infrastructure in the city centre, especially for elders and disable people (i.e. adjusting the height of platforms, improving information provision) and reduce passenger boarding and alighting time | • increasing the quality, accessibility and attractiveness of PT  
• introducing Clean High Mobility corridor in Krakow | • Substantially improve the subjective feeling of security, especially of vulnerable PT user groups (e.g. young, female, elderly) |
| 9.2 Car pooling system in Krakow | • Increasing the amount of shared spaces (it will result in decreasing the number of cars parking at University.)  
• Designing a new internet-based data information about free car spaces and potential clients  
• Contributing to a reduction of traffic congestion around University | • Introducing a new form of vehicle use for University employees and students  
• Remove the mobility car single users to rider share car users  
• Achieving high acceptance by users, close to zero-cost operation | • 60 daily users  
• Increase by 5% of person number using the same car to commute.  
• 30% of car owners and other interested in exchanging data about free places in their car  
• Reduction by 20% of parking facilities inside the University areas |
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<tr>
<th>9.5 Policy options for car sharing in Krakow</th>
<th>9.7 Bicycle renting in Krakow</th>
<th>10.3 New goods distribution scheme in Krakow</th>
<th>11.3 Sustainable mobility marketing in Krakow</th>
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| • there are no quantitative objectives within this measure | • To increase use of bicycles as a mean of transport  
• To integrate bicycle renting system with PT stops  
• To purchase 100 city owned bikes  
• To search for private funds and sponsorship of the system | • To establish efficient goods distribution in protected zones (100% clean vehicles)  
• To implement a system of distribution of goods by clean vehicles  
• To decrease amount of private carries entering old city centre  
• To protect the near curb space for delivery vehicles | • To ensure accessibility of essential urban infrastructures through integrated mobility planning |
| • To study options for car sharing using Krakow as test case for Poland  
• To identify financial feasibility, potential user groups, marketing approach, business model for car sharing in Krakow | • To promote a new "bicycle culture"  
• To launch the city owned bicycle renting system | • To develop coherent access control system for goods vehicles to protected zones  
• To improve quality of goods distribution  
• To achieve wide social consensus for goods vehicle access restrictions  
• To better organise distribution of goods in the city centre  
• To provide load edges for goods vehicles | • To establish a new "mobility culture" in Krakow based on a civic consensus building and consultation process  
• To create new psychological and economic incentives for sustainable mobility use  
• To ultimately develop a holistic concept for reducing the ecological footprint of mobility  
• To inform citizens about benefits of using PT, bicycle and pedestrian traffic  
• To introduce a new form of information  
• To facilitate and to attract PT use |
| • Recommendations for financial feasibility, potential user groups, marketing approach, business model for car sharing in Krakow test case for Poland | • 100 city owned bicycles for renting  
• 100 registered bike sharing users, plus occasional users  
• 10% of increase of bicycle use in non-pedestrian trips inside 2nd Road Ring  
• increased use of public transport + bike modes | • reduced goods vehicle movements in the demonstration area by 50%  
• increased free space for pedestrians  
• environmental improvements  
• acceptance level of shopkeepers above 65% | • 75% of citizens "have heard of the project"  
• 65% positive image of the project  
• 1000 project ambassadors in the city  
• to growth up of ecological awareness of the society  
• increase of reliability for transfer trips (reduction of missing vehicle at interchange by 40%)  
• reduction of PT travel time for trip with transfers by on average 4 minutes  
• growth up of PT demand by 3%  
• to increase of PT and non-motorised traffic use  
• improvement of quality measures in the term of regularity, punctuality, reliability and comfort |
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<tr>
<th>11.7 Mobility Forum in Krakow</th>
<th>11.9 An integrated mobility plan for Technical University of Krakow</th>
<th>11.16 Monitoring centre for road safety and accident prevention in Krakow</th>
<th>12.3 Info mobility platform in Krakow</th>
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</thead>
</table>
| • there are no quantitative objectives within this measure | • Increasing the use of sustainable transport modes  
  • Reducing parking needs for cars in the PK campuses  
  • Reducing traffic congestion near the Warszawska-Street | • To decrease amount of road accidents | • To compare environmental impacts car vs. PT |
| | | | | • Realise Mobility Forum in Krakow involving municipality departments, public transport companies, associations of public transport passengers and bicycle users, Quarter councillors and shopkeepers associations  
  • Co-participation of passengers in organisation of public transport  
  • To extend passenger rights  
  • To enable qualified decision-taking in transport planning | • Introducing an integrated mobility plan for students and employees of PK  
  • Changing mobility behaviours  
  • Creation of an institutional consultant of mobility  
  • Designing a new internet based information about Cycle parking, Walking initiatives, PT information, Special integrated fares for students and workers carpooling system | • To establish an Integrated Monitoring Centre for Road Safety and Accident Prevention  
  • To have an central resource and information management centre  
  • To improve methodology and technological aspects of accident data collection  
  • To improve road safety  
  • To improve way of defining potential “dangerous places” | • Launch an info-mobility platform in Krakow  
  • To integrate across all transport modes  
  • To have initially static personalised O/D-based trip planning | • Two major events per year plus 10 special events  
  • Continued high-level political support and good public image | • 5% traffic congestion decrease around campus  
  • 5% PT patronage increase of employees/students  
  • 15% increase in bicycle trips | | 1000 infomobility platform users per day |
| 12.6 Public transport priority system in Krakow | • Improvement of punctuality and regularity of PT vehicles operation;  
• Reduction of travel time between following stops and decrease of its randomness;  
• Enlargement of time-tables’ feasibility;  
• Removal the mobility from car users to PT. Enlargement of number of trips proceeded by PT means;  
• Reduction private cars in the city centre;  
• Improvement of the control and passengers information system;  
• Designing new indicators, in order to better describe PT operation (e.g. to estimate quality level in a vehicle); | • Designing a new database with measurements of PT vehicles operation;  
• To create image of public transport as reliable and punctual way of travel;  
• To introduce new possibilities for dispatching control; | • Increase by 3% of person number using PT system  
• Increase punctuality and regularity coefficients  
• Decrease of travel time in PT by 5%  
• Reduction of number of PT fleet by 10%  
• Improvement of the overall image of the PT services |
Measure 5.3 Transition towards clean vehicle fleet in Krakow

A big problem in Krakow is motorisation that leads to air pollution. The better ecological solution is to reduce air pollution in big vehicles, like city buses, rather than in small cars. Engines using CNG as a fuel fulfil EURO IV and V standards. MPK has already had some experiences in using CNG buses. Actually, MPK buses are less than 10% of all running vehicles contributing to the air pollution in the city. In the area of MPK bus runs there are many cultural relics, which are saved by the national law.

Some key results are the following:

- Basing on the desk research and exploitation tests: one-year test on 5 CNG buses, short test on hybrid and ethanol-driven vehicles one can say that nowadays there are different ways and solutions that enable to get low emission levels. A satisfactory environmental results can be reached by implementation of high quality traditional fuels, bio-flues and their mixture or advanced construction of engines and propulsion systems.

- The use of gas fuel in spark-ignition engines results in increase of energy consumption per mileage unit. The decision to conduct exploitation tests on 5 CNG buses required significant investment whereas the real fuel cost savings were much lower than expected. The CNG-driven bus is 20-25% more expensive than similar diesel vehicle. And even lower CNG fuel price cannot compensate high purchase and transition costs and make the investment cost-effective.

- The decision on introduction of CNG technology always depends on local conditions and factors. Basing on the Krakow experience one can recommend the CNG buses only if:
  - an operator has own gas filling station of good capacity,
  - maintenance facilities are proper to serve CNG vehicles with respect to all safety and security rules,
  - terms of contract with CNG provider ensure seamless fuel delivery at good price.
  Otherwise external financial and political (governmental) support is strongly required.

- Taking into account results of one-year tests of CNG-driven buses, outcomes of comparative analysis of both vehicle types - CNG and diesel - and their prices MPK's specialists came to the conclusion that optimal solution when speaking about the transition towards clean fleet would be substitution of old generation vehicles for new diesel ones constructed in accordance with the EURO V standard.

- The exploitation test on a SOLARIS hybrid bus conducted in July 2008 proved a fuel consumption decrease by 15 % in comparison to similar vehicle with traditional propulsion system. Furthermore, the percentage of fuel savings depends on a bus route, number of stops and driver’s skills. A proportional decrease in pollutants emission was also observed. noise level was much lower than that emitted by a conventional diesel bus, and could have been observed even without making any measurement. And finally, a start of the hybrid bus exploitation did not required any additional investment in a workshop infrastructure (as it was necessary in case of CNG vehicles).

- The results of research on ethanol-driven bus were satisfactory. However the implementation of this technology requires some adjustments of the fueling-up equipment as well as a guarantee of the fuel delivery. Moreover, taking into account ethanol-fuel price and tax level it is supposed that the exploitation costs will not be lower than those of diesel vehicles.

Measure 6.1 Integrated Access control strategy in Krakow
The city of Krakow is divided into three zones. The A – zone is only for pedestrians and cyclists. The B – zone is a limited traffic zone (only for inhabitants and goods deliveries). The C-zone is a wider zone with parking fees (from 10-18 o’clock).

Within the measure B zone was extended to Pl. Szczepański with dimensions approximately 62x62m and section of Dunajewskiego street to Grabarska street. Result of this operation is increase of B zone length by 310 m, without an influence on area size. There also took place reduction of parking area by 200 places.

There are two areas where on-street parking was eliminated: Malý Rynek (“Little Square”) with 100 parking places and Pl. Szczepański with 200 parking places. Theretofore these two historical squares were used only as parking lots, now there are restored to the previous condition and again use as a space for pedestrians-citizens and tourist.

Measure was very difficult to implement and a lot of objectives wasn’t realized for following reasons:

- Delays in realization of underground parking lots

Due to big political discussion and opposition of some city councilors, most probably only some element of the measure - extension of “B” zone will be implemented until end of the project. According to statement of Mayor of Krakow, more access restrictions and liquidation of on-street parking places will be possible from July 2009, after opening of first underground parking lot.

Site Coordinator is making efforts in order to achieve at least partial implementation of new access restrictions area. But it is too much political influence, and also influence of delays in infrastructure development (including underground parking lots).

It is needed in order to implement more access restrictions. Thus, no actual implementation of this part of the measure

It would not be possible to have results for situation “after”, if implementation will not be successful. But according to plans, only possibility for these to be done will be after July 2009.

To meet the evaluation requirements within the project lifetime the project proposes to evaluate all other elements of the measure which have been implemented as planned and to strengthen the process evaluation; M 06.01 is one of the measures for in-depth process evaluation.

The measure (evaluation) would benefit from the 3 months extension currently under discussion.

- Lobby in City Council against extending access restricted B-zone

The city administration (e.g. the responsible department for road administration) refused the measure implementation in the whole scope and proposed several cuts. The first scheme and its severe demands emerged to be too demanding. The reason was that the city administration wanted to prevent complaints on the part of inhabitants, shopkeepers etc. An interesting point is that in internal talks with the mayor, he suggested an even more severe restriction. However, first priorities for the city are hard measures as the improvement of infrastructure (parking, roads and public transport). Therefore the measure implementation very much relied on the process of tendering and subsequently constructing the underground car park. All in all, support from “inside” the administration is a crucial driver of the process

- Negative public opinion

Polish society is very much geared to possessing a private car. From the day cars became affordable and at the same time a symbol for freedom, Polish people strived to
have their own car. Understandably, to break this development is rather difficult. Moreover, a big part of Polish society is not aware of the problems caused by private transport and restricting car access is more associated with hindering a development than with a positive impact.

- Negative Information and public relations

From the very beginning the measure got much media attention since everybody could be affected by its implementation. Local media reported quite negatively about the plans to extend access restriction in the inner-city. The lack of a professional public relations strategy and the focus on the technical implementation of the measure was the reason for the negative image. But initial critique turned into more positive releases acknowledging the right direction of the measure and admitting that building roads does not solve traffic problems.

**Measure 6.4 Enforcement of access restrictions in Krakow**

There were made through traffic survey in whole B-Zone. The survey were conducted in average working day in afternoon peak period (15.30 – 18.30). For the survey purpose there were 17 gates defined:

![Map of Krakow with access gates](image)

*C2.4-1.: 17. Defined gates*

Some of them (number 4, 5, 6, 10-13, 15-17) were only one-directed (one way roads), rest of the measurement points were taken into consideration as both-directed (it is due to traffic scheme in the area).
During measurement, on all gates to the B-zone there were placed measurement point, where instructed person was registered all entering vehicle (the assumed procedure require plate numbers of the vehicle and entering/exiting time). All data were then compiled and verified in that way, that all vehicles entering the area were checked on all exits taking into consideration assumed travel time (for this purpose it was done additional travel time measurement for all possible routes inside the B-zone). In the result there were values of through traffic obtained on all entrances (missing gates on the chart state only exits from the area).

The key results are as follows:

- More than 60% vehicles entries to the zone B illegal
- 58% vehicles passing trough
- Reduction of trough traffic less than 3% (One of the thirteen gates was covered by electronic identification system).

**Measure 8.3 Clean high mobility corridor**

During this project we could use new innovative aspects such as:

- Technology of sound and visual information in tram and buses,
- Tram stations with model character – Model character in terms of accessibility, safety and information provision. The tram stops placed on lines built in the street pavement are presently on the same level as vehicle lanes. The main idea was to shift the area of the stop to the level of curb to ensure easier accessibility of the tram and improve safety of the boarding passengers. Moreover to the all model stops there have been provided real time information about departure time of PT lines.
- Strategy to improve PT security and safety – speed reduction near PT stops, adjusting the height of platforms etc.
- Separated traffic lanes - Separate lanes for public transport vehicles reduced the transit time between stops, which affect a significant improvement in throughput transport corridor.

For the evaluation purpose there were taken chosen results estimated in corridor one:
Results of the implementation:

- All buses operating in public transport meets high level of EURO standards.
- Two model tram stations improve accessibility, safety and passenger service time.
- Adjusting street level to the height of platforms, allowed reduction of average speed to 10 km.

<table>
<thead>
<tr>
<th>Model stops nr 1</th>
<th>Model stops nr 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubicz - Mogilska</td>
<td>Lubicz – Basztowa</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situation “before”</th>
<th>Situation “after”</th>
</tr>
</thead>
<tbody>
<tr>
<td>33,5 km/h</td>
<td>23,1 km/h</td>
</tr>
<tr>
<td>30,2 km/h</td>
<td>20,9 km/h</td>
</tr>
</tbody>
</table>

- Improvement of passengers boarding and alighting time at model stops was a result of adjusting height of platforms.

<table>
<thead>
<tr>
<th>Model stop</th>
<th>Reducing of service time [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubicz – Mogilska</td>
<td>10%</td>
</tr>
<tr>
<td>Lubicz - Basztowa</td>
<td>10%</td>
</tr>
</tbody>
</table>

Reduction of service time at stop – statistic data

Measure 8.6 Demand-responsive transport services in Krakow
The aim of the project is to launch and test a demand-responsive bus service in the areas of Rybitwy, Podwierzbie, Biezanow, by initially using 2 small buses. It is the residential and industrial area with low density of people where PT conventional service is not sufficient and characterises with a low frequency of bus runs. The other goal of DRT implementation in this determined area is to make it easier for inhabitants to reach the communication junctions where changes for other lines are possible.

The daily DRT service operation is managed by Transport Dispatch Center – a part of MPK organizational structure. DRT clients contact dispatchers by phone using a special free line dedicated only for DRT services. Dispatchers collect the information from passengers, input data to the system, the system plans routes and output information is given to TELE-BUS drivers. The only limitation from the passengers’ point of view is fact that an order must be placed at least 30 minutes before the planned start of the trip. The communication between TDC and drivers is based on mobiles phones and private radio network.

**Operating hours:**

**Tele-bus service:**

Monday – Friday from 8.00 to 23.00

Saturday – Sunday from 6.00 to 23.00

**Transport Dispatch Centre:**

every day from 7.30 to 21.00

The innovative aspects of the measure are:

- First demand responsive transport service in Poland – there are no similar solutions in Poland. It has very innovative aspects in Polish conditions due to flexible usage of rolling stock in less dense areas of the suburbs.
- Dial and Ride system and irregular bus lines,
- Design of the demand-responsive transport concept, including network planning, organizational, legal and financial issues

![Number of passengers transported by the Tele-bus](chart.png)
The new DRT service launched in Krakow in mid July 2007 were gradually developing during the first year of its performance, starting with 300 clients per month in first quarter, exceeding 2000 served passengers in January 2008 and finally reaching a stable monthly average of 1700 transported Tele-bus.

![Graph showing bus runs and kilometers made by TELE-BUS](image)

**Number of bus runs and kilometers made by Tele-bus**

49% of the Tele-bus clients admitted they used PT more frequently after the launch of the flexible service.

Thanks to this project, it is planned to expand the service and consequently induce the increase of the Tele-bus service use, i.e. to reach a higher number of transported passengers and kilometers made by Tele-buses
Measure 8.8 New leisure related mobility service in Krakow

The main purpose of this measure is to encourage people to use bicycles as regular mean of transport and raise the use of PT for trips to recreational areas, by:

- installing innovative bike carry facilities on 12 buses
- marketing the service (with information brochure)
- testing the system for future use from suburban areas to the city centre
- creating a new model of going outside the city center by bus, not by own car
- improvement of travelling comfort when going by PT buses for bike trips to recreational areas

Public transport bus routes on which buses equipped with bike carrying facilities operate

Key results:

- The new leisure related mobility service was generally accepted by the citizens of Krakow. Particularly high acceptance level for the new service was recognized at the beginning of the measure implementation.

<table>
<thead>
<tr>
<th>Level of acceptance for buses with bike carrying facilities</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>amount</td>
</tr>
<tr>
<td>Yes</td>
<td>980</td>
</tr>
<tr>
<td>No</td>
<td>41</td>
</tr>
<tr>
<td>Hard to say/ I have no opinion</td>
<td>189</td>
</tr>
<tr>
<td>Total</td>
<td>1210</td>
</tr>
</tbody>
</table>
• The awareness of the bike holders on PT buses was increasing in the following seasons of the service availability. But the service launch did not resulted in the raise of readiness to use PT transport for the purpose of bike tourism.

• Economy indictors (both operating costs and operating revenues) related to provision of the new leisure related mobility service turn out to have low impact on the overall operation on chosen bus lines.

• The results of evaluation activities proved that bike currying facilities were used most frequently on line number 134 (leading to the ZOO). The most probable reason of such results is that the area of ZOO is very popular among down-hill cyclists, and according to observations made by bus drivers this group of customers is the biggest one on this particular line.

![Number of bikes transported by each of chosen bus lines in the period V - VIII 2007](image_url)

**Bus-bike users in the period May - August 2007**

**Measure 8.10 Integrated ticketing and tariffs in Krakow**

Within this measure the City of Krakow was testing an integrated ticketing and tariff solution between local PT and national railway. Due to limited budget possibilities this measure was focused on 1 line (in Krzeszowice - Krakow corridor).

Integrated tariffs and ticketing were only available within the city area, on buses and trams of the PT operator MPK. There was no integrated ticketing between railway and other transport modes. Suburbs rail lines in the surrounding of Krakow are suffering a decreasing in the amount of passengers and are often being closed, due to missing profit. Thanks to this measure the situation has changed.

**The results of project:**

- The sale an integrated ticktets have increased by more than a 50% from March to September and the tendency is still growing up.
- After implementation share an integrated ticket in the general sold train tickets numbers is 9%. The sell one-trip tickets decrease by 12%. The share of other tickets without any changes.
- Although 75% of the passengers have very frequents trips to Krakow and inside Krakow almost 58% of them use single trip tickets which shows for most of the passengers use there is not much tend to have periodical tickets.

Structure of sold Publik Transport tickets

- The patronage in PT have increased by 10% (on Krzeszowice-Krakow corridor)
Measure 8.11 Security action plan for public transport in Krakow

Within this measure, with strong interrelation to measure 8.3 “Clean high mobility corridor”, a specific integrated public transport security concept was developed in Krakow. The security audit was focus on the first place on tram stops on the First ring road, where passengers has to share the same area with vehicles (there are tram stops shared with vehicle lines – stop is located at the centre of the street) Security issues related to women have been particularly taken into account.

The results of project:

- Adjusting street level to the height of platforms, allowed reduction of average speed to 10 km/h.

<table>
<thead>
<tr>
<th>Average vehicle speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model stops nr 1</td>
</tr>
<tr>
<td>Lubicz - Mogilskia</td>
</tr>
<tr>
<td>Situation “before”</td>
</tr>
<tr>
<td>Situation “after”</td>
</tr>
</tbody>
</table>

- Two model tram stations improve accessibility, safety and passenger service time.
- Preparation of the final redaction of Safety Audit and Safety Action Plan for PT. The document for future investment activities.

Measure 9.2 Carpooling system in Krakow

The objective of this measure is to implement the carpooling system for commuters, working at Krakow University of Technology. Thanks to the system it will be possible to increase the amount of shared spaces in private cars. The other objectives:

- Introducing a new form of vehicle use for University employees and students,
- Designing a new internet-based data information about free car spaces and potential clients,
- Remove the mobility car single users to rider share car users,
- Achieving high acceptance by users, close to zero-cost operation,
- Contributing to a reduction of traffic congestion around Cracow University of Technology.

The key results are as follows:

- The value of indicator “Awareness level” increased after measure implementation almost twice.
- About 30 trips registered in carpooling system every month.
- 53 % of respondents favorably receive or approve the implementation of carpooling system.
- Number of persons which are interested in carpooling did not significantly changed as a result of measure implementation.
- Average vehicle occupancy at weekdays increased from 1.11 to 1.19 [pers/veh] what is 7 % growth. However average vehicle occupancy at weekend days decreased by 5 % (from 1.47 to 1.40) it is not the negative result of measure implementation. The reason of this change can be the date of measurement – measurements in situation after were conducted when there was no regular classes.
- However there is no security procedure that verifies address data of registered users more that 50 % of users think that the system is safe.
- Number of persons using carpooling grew, depending on target group, from 9 to 25 % for fulltime students and from 25 to 56 % for extramural students. In spite of the fact that there is a large number of persons using carpooling probably only few of them use developed carpooling website.

### Number of persons using carpooling in commuting and frequency of travelling in carpooling before measure implementation

<table>
<thead>
<tr>
<th>Target group</th>
<th>Sample size</th>
<th>Percentage of target group that use carpooling [%]</th>
<th>Frequency of travelling in carpooling [trips/week]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>263</td>
<td>19,4</td>
<td>3,50</td>
</tr>
<tr>
<td>Fulltime students</td>
<td>385</td>
<td>8,0</td>
<td>2,32</td>
</tr>
<tr>
<td>Extramural students</td>
<td>384</td>
<td>24,2</td>
<td>1,86</td>
</tr>
<tr>
<td>Total</td>
<td>1032</td>
<td>16,9</td>
<td>2,56</td>
</tr>
</tbody>
</table>
Number of persons using carpooling in commuting and frequency of travelling in carpooling after measure implementation

<table>
<thead>
<tr>
<th>Target group</th>
<th>Sample size</th>
<th>Percentage of target group that use carpooling [%]</th>
<th>Frequency of travelling in carpooling [trips/week]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fulltime students</td>
<td>117</td>
<td>24,5</td>
<td>2,90</td>
</tr>
<tr>
<td>Extramural students</td>
<td>54</td>
<td>55,6</td>
<td>2,03</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>34,3</td>
<td>2,46</td>
</tr>
</tbody>
</table>

- Frequency of traveling in carpooling increased from 2,32 to 2,90 [trips/week] (25 %) for fulltime students and from 1,86 to 2,03 [trips/week] (9 %) for extramural students. For fulltime students it is mainly caused by unofficial parking localized close to University.

- However frequency of traveling in carpooling increased the average number of passengers in carpooling decreased. It can be caused by increasing number of cars among students which are not familiar with carpooling or simply do not want to use carpooling.

Measure 9.5 Policy options for car sharing in Krakow

The main goal of this measure was to develop a car sharing implementation and business study in Krakow, based on the experiences of the car sharing scheme in other cities.

Car sharing implementation and business study in Krakow have included the following elements:
- Analysis of socio-economic and political conditions for transferring a good practice example of car sharing
- Analysis of target groups and user requirements
- Car sharing marketing strategy
- Detailed analysis of potential locations of car sharing vehicles
- Detailed organisation plan of daily car sharing operation

The City of Krakow considers car sharing as a promising option for transport demand management in order to reduce the negative impacts of car traffic.

The key result
- Only 11% of the repliers have been acquainted with car sharing system. The reason can be that car sharing is not a very old and popular system among people. The importance of informing society about this system to gain the best result is comprehensible.

- According to results from survey 40% of the people who have the possibility of choosing PT or using their own car chose PT to travel in Krakow, which shows they consider PT of Krakow as a reliable mode of transportation.
As the diagram shows the main group of carsharing’s users will be the working classes and students. Its more than 80% surveyed. (C6-2)

**Measure 9.7 Bicycle renting in Krakow**

Implementation of the measure is an innovation due to:

- New conceptual approach – The integrate bike renting facilities/places with bus/tram stops to have an integrated approach and to promote combined use of soft modes, especially within the historical city centre.

- Targeting specific user groups – Bicycle renting system in Krakow is targeting few specific groups of users. First group are all people who live in Krakow and they will use bike to short trip. Second group are tourists who will visits city on the bike.

- New technical approach – First approach for testing non-service bike renting in Krakow.

As the result of measure’s implementation12 places with 140 places on cycles have been chosen for localization of bicycles which can be seen in picture mentioned below.
Based on surveys and city municipality data bicycle riding modal split share is 1-2% in total non-pedestrian trips in the city.

Average quantity bike-trip on day in period from 15.11.2008 till 27.11.2008 amounted 100. In this time 500 people has been registered. Half of them uses bike renting effectively

The key results

- Most of the bike trips in city. Additional 100 trip daily (winter!).
- Public Transport and Bicycle renting system can complement each other.
- Complement of bicycle infrastructure in Krakow.

Measure 10.3 New goods distribution scheme in Krakow

The objective of this measure is to change the present situation of goods distribution to the city centre.

The new organization of the system will be based on collecting the mobility credit points from every goods distribution vehicle starting unload operations on the Market Square. The points given to every carrier depends on time of delivery, and kind of engine (fuel). When the goods distributors will adopt to new regulations, they do not need to pay any additional costs. If carriers are not willing to change their habits, they have to buy additional mobility points or are not able to reach the Market Square in some periods of the day.

The key results are as follows:

- It seems that ‘Noise’ is not the main problem for people in the city center and the biggest problem for inhabitants and tourists is the system of car parking’s, the system which allows people to park their car in the pavement. According to surveys 64% of the citizens consider this system as the most annoying problem in the city center and only 19% of them chose noise as their disturbing point.
- Based on the results from the survey the periods with highest rate of noise are 10.00-16.00 and 16.00 up to 19.00 which means that the noise is not perceived by inhabitants and tourists as a problem connected with deliveries. At that time goods
distribution on the Market Square is forbidden, so the noise is connected with usual daily activity.

Measure 11.3 Sustainable mobility marketing in Krakow

The first step for the implementation of the measure was the creation of a “Report on integrated marketing scheme for sustainable transport modes in Krakow” The document has been delivered in February 2007 (25th month of project).

Activities in this measure have been divided into 3 main groups:

1. **Seminaries** and events focused on different issues of sustainable mobility. Up to now 10 out of 15 planned seminaries have been organized.

2. **Incentive system** aiming at promoting and stimulating the use of public transport modes and furthermore promotion of existing tickets (i.e. family tickets) among citizens. During the first 3 months of the existence of this system, more than one thousand citizens have participated and more than 3000 items have been handed over.

3. **Mobility education concept** for schools and companies – Municipality of Krakow provided educational posters - “Ecologically mobile, city-friendly”.

Apart from the activities described above, the Municipality has organized special events in order to promote sustainable behaviours among citizens i.e. Competition for the slogan promoting sustainable transport, series of event organized during European Mobility Week in 2005, 2006, 2007 and 2008.

Furthermore during the implementation of this program we have noticed that most of people treat this event only like occasions to get free gifts not trying even to think “what is behind” and why it is organized. Surveys showed that car drivers (the objective was to stimulate use of sustainable modes by this target group) were rather not interested in this event. It is worthless to make event, trying to convince people to use public transport or bicycles, only for people who are already using these modes.

Measure 11.7 Mobility Forum in Krakow

Before the Forum existed there was not an opportunity to discuss different public issues with different stakeholders and citizens. Now the Mobility Forum is an opportunity for citizens to express their opinions.

Since 2006, meetings have been held by the municipality which respectfully arranged one in 2006, two times in 2007 and six times in 2008 and has been planned to persevere with three more meetings in 2008.

Since the first meeting 455 people participated in meetings and the yearly average of number of participants are 45, 50 and 52 persons

**Average number of participants of Mobility Forum:**

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Number of participants</td>
<td>45</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Average number of</td>
<td>45</td>
<td>50</td>
<td>52</td>
</tr>
</tbody>
</table>
The results of project:

- 94% of the repliers agreed about initiating a Mobility Forum in Krakow which shows that citizens are eager to be involved in decision-making process of transport activities in Krakow. The number of supporters of Mobility Forum in May 2007 increased up to 97%!

<table>
<thead>
<tr>
<th>Period</th>
<th>Acceptance level</th>
<th>Awareness level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>Rather yes</td>
</tr>
<tr>
<td>2006</td>
<td>53%</td>
<td>40%</td>
</tr>
<tr>
<td>May 2007</td>
<td>61%</td>
<td>36%</td>
</tr>
</tbody>
</table>

- Summing up, the public opinion believes that the Forum Mobility and projects, which are related with the Forum, are necessary. More than 95% repliers agree with that. But on the other hand the knowledge about the Mobility Forum in Krakow still is inconsiderable. In the year 2006 only 16% of respondents was aware of activities organized in measure 11.7, in May 2007 only 27% There are two conclusions. People (Citizens) accept the Mobility Forum, but there is still a lot to do concerning dissemination of this activity.

**Measure 11.9 An integrated mobility plan for the Technical University of Krakow**

Traffic congestion near the Warszawska-Street was the main reason of loss of time and had a considerable influence on the environment and on the decrease of accessibility. This situation was due to an ongoing strong trend of increasing car ownership, especially among young people.

There were also problems with parking – The Technical University of Krakow on the Warszawska-Street is placed in the city centre, in B-zone and the access to the University
car parking is difficult due to a decreasing number of parking places on the campus. Parking places will be reduced in the near future as a result of the construction of a new library of PK. Students and employees will be enforced to either park in a restricted car parking zone or change their means of transport.

The main consequence of measure was developing two working Documents:
WD 11.9.1 – “Concepts about PT connections, bicycle paths and carpooling system” and
WD 11.9.2 “An integrated mobility plan for Technical University of Krakow”

The results of project:

- Number of bike trips was increased of 1% for employees and extramural students (probably thanks installation of new bike rack, educational and marketing activities). Concerning trip conditions in Krakow (lack of cohesive bike system) and lack of implementation of concept of bike paths between PK campuses it is a good achievement.
- Number of car trips was decreased for employees of 4% and for extramural students of 20% (!). It is a very good achievement. For extramural students it was probably shift from car trips (only as a driver) to carpooling trips.
- Number of carpooling trips was increased for employees of 4% for full-time students of 7% and for extramural students of 16%. It means that carpooling become a very popular and the “Jedźmy razem” system was successful implemented. Other explanation – in past employees and students traveled by carpooling but they were not aware about it, thanks marketing and educational activities they knew term of carpooling.
- Employees’ and students mobility behaviors have been changed towards sustainable mobility modes, the usage of sustainable mobility modes is increased little by little
- The needs for parking at University campuses were reduced because of increase in carpooling trips
- Number of parking places for bikes was increased from 60 to 160 and now most of employees and students are satisfied its sufficient number
- Technical University of Krakow probably as a first institution in Poland have implemented mobility plan and created a mobility consultant position
- The number of people who visited the internet database about sustainable mobility “Info.Komunikacja” is over 1300

Measure 11.16 Monitoring Centre for Road Safety and Accident Prevention in Krakow

The objective of this measure is to set up a monitoring Centre for Road Safety and Accident Prevention. The functioning of the Centre is strongly connected to innovative methods of data collection, i.e. by using mobile equipment when registering road accidents. The development of methods for data collection is enable a deeper and better analysis for the definition of potential “dangerous places”.

New sources of data are integrated in the system and new stakeholders are involved in the data collecting process. Insurance companies are a very important source of data given the fact that the information collected by the Police refers only to very serious accidents, while that provided by insurance companies refers to a wider range of accidents. The real road safety conditions in Krakow can be obtained by analysing the whole situation, including different data from several sources.
By combining enhanced accident data with using vector maps and GPS system, much deeper and fruitful spatial analyzing will be possible. That kind of post-processed information will improve road safety in Krakow.

The results of project:

- Correlation of number of accidents and number of injured clearly has decreasing tendency since 1977 which can be result of new safety equipments of the cars and more awareness from the drivers. It should be noticed that the different causes of any kind of decreasing in tendency of accidents after implementation cannot be separated from each other and decreasing in amount of accidents or injuries can be because of many cause.
- Indicators number 2 and 4 (Number of accidents and Transport Safety) are conceptually very similar; we can see this similarity in their description and available data as well. It seems that we can merge together the results.

Measure 12.3 Infomobility platform in Krakow

There was no official website which described all types of transport using in Krakow and included module of the calculation of environmental impacts or develop module of trip planning. Before implementing Civitas some information about tram and bus networks and timetables was and still is available at MPK Internet site. It includes time tables for each of stops in both directions for each line.

The measure objectives were:

- Launch an info-mobility platform in Krakow
- To integrate across all transport modes
- To have initially static personalised O/D-based trip
- To compare environmental impacts car vs. PT

The results of the measure:

On basis of data gathered in July 2007 (the number of visitors of the “transport” tab on the “Magic Cracow” website as well as the site of MPK SA - the trip planning search engine) can assume that the number of users of infomobility platform will be the same or higher.

Data in table below

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MPK SA – the trip planning</td>
<td>40 000</td>
</tr>
<tr>
<td>“Magic Cracow” - “transport” tab</td>
<td>97 464</td>
</tr>
</tbody>
</table>

Measure 12.6 Public Transport Priority System in Krakow

Krakow hadn’t have an priorities system for Public Transport. There were some good solutions, but they do not form cohesive system. The main objective of this measure was to improve public transport quality in Krakow. The best way was to implement the corridor with full priority for PT vehicles, with separated common lane for trams and buses or lane for buses. The location of this corridor had to be decided with taking into consideration its meaning for public transport system in Krakow.
During the project following measures were executed:

- About 27000 departures from stops were registered – in situations: “before” and “after” separated tram-bus (corridor I: Rondo Mogilskie - Filharmonia) or bus (corridor II: Cracovia – Cmentarz Rakowicki) lanes implementation.
- About 800 surveys at tram and bus stops were made.

The main consequence of this measure is, that tram-bus and bus lanes separated at several sections caused time shortening of those sections and a significant decrease of its randomness regarding the timekeeping. Those results are obtained mainly during the working day, especially during the afternoon peak hour.

6.5 City Findings

Caravel project has brought a new quality to the transport system of Krakow. The implementation of different measures and their significant number (18) influenced how public transport is perceived by inhabitants. The Civitas Caravel brand is well perceived and recognizable as a very innovative initiative, improving quality of life in the city. The impact of implemented measures was assessed and obtained results state proper background for the most important findings, grouped in four sections:

Environmental impact:

- All buses operating in public transport high clean mobility corridor meet high level of EURO IV standards;
- The exploitation test on a SOLARIS hybrid bus conducted in July 2008 proved the fuel consumption decreased by 15 % in comparison to similar vehicles with traditional propulsion system. Furthermore, the percentage of fuel savings depends on a bus route, number of stops and driver’s skills. A proportional decrease in pollutants emission was also observed. Noise level was much lower than that emitted by a conventional diesel bus, and could have been observed even without making any measurement. And finally, a start of the hybrid bus exploitation did not required any additional investment in a workshop infrastructure (as it was necessary in case of CNG vehicles);

Energy Impact:

- The use of gas fuel in spark-ignition engines results in increase of energy consumption per mileage unit. The decision to conduct exploitation tests on 5 CNG buses required significant investment whereas the real fuel cost savings were much lower than expected. The CNG-driven bus is 20-25% more expensive than similar diesel vehicle. And even lower CNG fuel price cannot compensate high purchase and transition costs and make the investment cost-effective;
- The service DRT is operated by Euro III medium-sized vehicles. The monthly fuel consumption (Vehicle fuel efficiency MJ/km) is approx 6,5 MJ/km

Transport impact:

- Extension of B Zone to Pl. Szczepanski and section of Dunajewskiego street to Grabarska street. Result of this operation is increase of B zone length by 310 m, without an influence on area size;
• On two areas on-street parking were eliminated: Mały Rynek with 100 parking places and Pl. Szczepański with 200 parking places (those places are again used as a space for pedestrians and tourists area);

• In spite of the fact, that only one of the thirteen gates was covered by identification system, through traffic has decreased with approx. 3%;

• Strategy to improve PT security and safety – 10% speed reduction near PT stops, adjusting the height of platforms;

• First demand responsive transport service in Poland – there are no similar solutions in Poland. It has very innovative aspects in Polish conditions due to flexible usage of rolling stock in less dense areas of the suburbs;

• Average number of passengers exceed 1500 pas / month and is growing;

• Stable tendency of ridership (vehicle – kilometres) – approx. 4 000 vehkm / months;

• 49% of passengers declare more frequently usage of PT due to improving PT accessibility;

• Significant growth of passengers using integrated ticketing system – from 124 in March to 320 in October. The most important is the growing tendency, which suggests more and more interests in such solution;

• 7% of growth in average vehicle occupancy during weekdays;

• Number of carpooling trips was increased for employees of 4% for full-time students of 7% and for extramural students of 16%. It means that carpooling become a very popular and the “Jedźmy razem” system was successful implemented. Other explanation – in past employees and students traveled by carpooling but they were not aware about it, thanks marketing and educational activities they knew term of carpooling;

• Number of parking places for bikes was increased from 60 to 160 and now most of employees and students are satisfied its sufficient number;

• Number of car trips was decreased for employees of 4% and for extramural students of 20% (!). It is a very good achievement. For extramural students it was probably shift from car trips (only as a driver) to carpooling trips;

• The average occupancy for the tele-bus service in the period July 07 – September 08 was ca 4,0 passengers per trip (11.5% when taking into account the vehicle capacity of 35 persons). As the average occupancy for the regular lines in the Tele-bus area did not change after the launch of the flexible service the users of the letter one may be considered as new clients.

Society impact:

• Implementation of model tram stops - model character in terms of accessibility, safety and information provision. The main idea was to shift the area of the stop to the level of curb to ensure easier accessibility of the tram and improve safety of the boarding passengers. Moreover to the all model stops there have been provided real time information about departure time of PT lines;

• High level of acceptance for Demand Responsive Transport system implementation, among inhabitants;

• Over 81% of passengers accepted carrying facilities for bikes, even at the beginning of implementation phase;

• Preparation of Safety Audit and Safety Action Plan for public transport – basic document in further investment activities;
• Significant growth of carpooling awareness level among students and employees of Cracow University of Technology and high level of interests for registering to carpooling system;

• According to results from survey 40% of the people who have the possibility of choosing PT or using their own car chose PT to travel in Krakow, which shows they consider PT of Krakow as a reliable mode of transportation;

• High level of acceptance for bicycle renting scheme – during first two weeks of operating of the system, over 500 users have been registered. Over 250 of them are using bikes effectively due to relatively low temperatures (in spite of Autumn / Winter time);

• Noise is not perceived as the main problem for inhabitants in the city centre and the biggest problem for them and for tourists is the system of parked cars (the system which allows people to park their car in the sidewalk). According to surveys 64% of the citizens consider this system as the most annoying problem in the city centre and only 19% of them chose noise as their disturbing point;

• Incentive system aiming at promoting and stimulating the use of public transport modes and furthermore promotion of existing tickets (i.e. family tickets) among citizens. During the first 3 months of the existence of this system, more than one thousand citizens have participated and more than 3000 items have been handed over;

• 94% of the repliers agreed about initiating a Mobility Forum in Krakow which shows that citizens are eager to be involved in decision-making process of transport activities in Krakow The number of supporters of Mobility Forum in May 2007 increased up to 97 %;

• The public opinion believes that the Forum Mobility and projects, which are related with the Forum, are necessary. More than 95% repliers agree with that. But on the other hand the knowledge about the Mobility Forum in Krakow still is inconsiderable. In the year 2006 only 16% of respondents was aware of activities organized in measure 11.7, in May 2007t only 27% There are two conclusions. People (Citizens) accept the Mobility Forum, but there is still a lot to do concerning dissemination of this activity;

Main lessons learned:

• Lack of social acceptance for partial limitation of regular PT with simultaneous introduction of flexible better customized transport service. The introduction of the Tele-bus service was based on the assumption that two of the regular bus lines would be limited i.e. would only operate during the peak time. Unfortunately, inhabitants of the target area couldn't see additional value of the new flexible service - a possibility to be served exactly at the time they need without adjusting their trips to fixed schedules. They perceived the proposal only as an attempt to reduce the City costs and to take away PT service. Politicians decided to take into account the public complaints and keep conventional PT unchanged during the pilot phase. Such a decision, inconsistent with the assumption made in preparation stage, has its influence on chosen economy indicators, which in fact are difficult to be measured.

• Lack of proper offers from bicycle producing companies’ force some months of delay in project. It seems that one of the reasons which make companies not be very motivated in participating in tenders was the constructor of contract offered by municipality which could not clearly define which side should be responsible for
controlling the renting system. In new contract is defined that the company would be responsible for renting system for three years and the benefit is also be fully for company.

- Lobbing by shopkeepers from the city centre in City Council against new distribution of goods system – new system is perceived as a complication and its cost-effectiveness is doubtful. During the meetings among stakeholders, independent logistic expert was invited to show what are the advantages and disadvantages of different solution. It helped much, because Municipality workers were perceived as to much involved in the project and not really objective. Still City council is not satisfied with the possible solution based on mobility points.