



ENERqi

energy efficiency by using daily customers' quality observations to improve public transport



INTELLIGENT ENERGY
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Deliverable 5.2.1 1st Benchmark Report

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1 INTRODUCTION

The 1st Benchmark Report of ENERQI is the first comparison of results from the demonstrations carried out in the project.

The quality monitoring data is systematized, compared over time and between sites. The comparison of aggregate indicators per sites allows identifying common patterns and differences across countries. This provides additional insight on various local characteristics and suggests useful lessons for a better interpretation of quality monitoring results (Chapter 3).

The amount and especially the time of realization of observations does not allow yet to understand effects on perceptions of quality improvements realized during ENERQI. However, it is possible to plausibly relate some of the results obtained with recent improvements. Given the known difficulties in empirically establishing a relation between evolution of quality perceptions and public transport use, a proposal is made to provide rough quantitative estimations on the basis of previous results found in the literature. An example is provided on the method proposed for use in the 2nd Benchmark Report and final assessment (Chapter 4).

Finally this report describes a complete overview of the main barriers and lessons raised by local implementers in respect of experience of implementation of the ENERQI methodology, comprising all the set up phase and some experience from the operational phase (Chapter 5).

Before the analyses above, a description of the sites and their quality monitoring context and implementation details is provided (Chapter 2).

2 SITES AND CONTEXT

2.1 Site description and local quality monitoring activities

2.1.1 Noord-Brabant region, The Netherlands

In The Netherlands there are some 70 so called concessions. A concession is in fact a geographic region. Each concession is granted to one operator based on an open European Tendering procedure. Within ENERQI five concessions of the Noord-Brabant region take part in the project: West-Brabant (operated by Veolia), Midden Brabant (Veolia), Brabantliner (Veolia), Oost-Brabant (Arriva) and De Meijerij (Arriva). They all started operations in 2006 for a period of 8 years.

They operate in areas with relatively low population density compared to urban areas. Noord-Brabant as a whole has a density of 490 inhabitants/km².

All public transport in the region is done by bus. There are two private operators: Veolia and Arriva. In total they exploit more than 100 bus lines. There are many differences in the level of service. In the urban areas the regular frequency varies between once every half hour to every 10 minutes. In the rural area most of the services have a frequency of one hour.

The share of public transport by bus is less than 2% if we look at the total number of trips in the total region. In urban areas this share is higher.

Most of the customers are so called captive travellers, who don't have an alternative. Many students travel by bus for school trips. On some lines the share of school trips by bus is in the range of 70% of all trips.

Monitoring of the quality level of service is done on a regular basis from 2005 to present. Once per year questionnaires are conducted inside the busses (OV-klantenbarometer). More regularly quality observations are done by volunteers (quality scouts) as part of the 'Kwaliteitsverkenner' project, which is the predecessor of the ENERQI approach. The customer satisfaction level is in general above 7 (on a scale from 1 to 10).

The three aspects that influence the observers' opinion about the public transport the most in a negative way are listed below. These are aspects that need extra attention from the operator because a decline of these aspects will have a direct negative influence on their overall satisfaction. The percentages given describe how many volunteers mentioned this aspect as a negative influencing factor to the overall satisfaction.

- Price (23,5% of volunteers)
- Crowding on buses (16,4% of volunteers)
- Punctuality (15,0% of volunteers)

2.1.2 Toulouse, France

Toulouse Public Transport (PT) network is operated by Tisséo (private operator). The PT network is composed by 2 metro lines; 1 line of tramway; 73 lines of buses; 16 lines subcontracting for Transport on Demand and regular lines; 17 school lines. Are also proposed to Toulouse inhabitants (840.000 inhabitants located in the Public Transport Perimeter, covering 89 municipalities) carpooling, carsharing and bikesharing services and also a minibus service for disabled people.

More than 100 millions travels have been realised in 2010 and the PT modal share would be around 8% (figures from the last: "Enquête Ménages Déplacements" delivered in 2004).

The customers of the PT network are split as following:

- 54% females;
- 24% under 25 years, 50% from 25 to 54 years and 26% over 55 years and more;
- 51% active, 19% students, 18% retired et 12% other situation non communicated;
- 61% Toulouse inhabitants, 39% suburbs inhabitants.

With the second line of Metro (line B) inaugurated in 2007 and the reopening of a line of tram in 2011 after more than 50 years of disappearance of this transport mode in Toulouse, the PT network have been deeply reshaped. Important ITS improvements have been also integrated as the e-ticketing or the real time travel information system. More recently (March 2012) a bus line running overnight has been launched (Noctambus) and very good feedbacks on this new service have been recorded.

In terms of previous monitoring activities, three applications of quality control systems have been already implemented by Tisséo over the last years: the PT Image and Satisfaction Barometer, the Mystery Guests Surveys and the Panel of Mobility.

2.1.3 Lisbon, Portugal

In Lisbon the ENERQI quality monitoring is being tested by Carris, the city bus and tram operator for local urban lines. It is a public operator and one of the two main operators (with the metro, also public) of the central part of a large metropolitan area. It carries about 240 million passengers per year.

Carris works accordingly to a context of high demographic density and a relatively high use of public transport (32% in a metropolitan area with 2,5 million inhabitants). There is a wide diversity of customer segments. The customer base of Carris is divided in four groups: Active executive (37%), Active non-specialized (24%), Students (24%) and Seniors (15%). The first two groups also correspond to the more sensitive to quality users, while the later are generally less sensitive due to lack of alternatives.

The improvement and communication of quality has been on the top of the priorities list of the company for the last few years. The major measure has been the renewal of the bus fleet, which came from 16,5 years in 2003 to 6,7 years in 2010, with impacts on comfort, image and the environment. Additionally, issues like information services, punctuality, commercial speed or staff training have been subject to specific measures. Intensive communication activities were developed with a focus on sustainable development and high quality services. At the same time, it created the movement “Menos um carro” in Portugal, destined to promote sustainable mobility¹. The proximity in the relation between costumers and the company has been a focal point, mainly through the new website and the policy of interaction with costumers.

To monitor the opinion of costumers on the quality of the public transport provided, Carris has been doing regular (yearly) costumers surveys to evaluate the evolution of satisfaction of clients. However, a further understanding of the effects of the various measures implemented on perceived quality is needed, for a more judicious selection of actions to take in the future. This need gains additional importance in the present economic situation, where the continuation of hard measures will be highly restricted in the years to come, bringing the need to concentrate of softer, low-cost measures, for quality improvement. The ENERQI methodology seems to be a correct answer to this context.

2.1.4 Graz, Austria

The Holding Graz Linien, which is part of Holding Graz, is the largest supplier of public transport in southern Austria and the second largest supplier of local public transportation in Austria. Holding Graz Linien operates 7 tram lines with about 55 trams and 27 bus lines with 148 busses (plus 8 night bus lines that operate on weekends). About 100 million passenger trips are made per year, this are about 277.000 trips per day. GVB has about 870 members of staff; about 500 of them are driving staff.

Special focus is laid on the high quality of public transport and – linked to that – on passenger information and customer care. Holding Graz Linien operates an integrated transport information system (ITCS). It helps to further optimise the operation but is also a basis to ensure a modern, efficient and competitive public transport.

The ITCS is the backbone for the dynamic, real time passenger information system which operates 163 steles at bus und tram stops, showing the real time departure time of the next vehicles.

Graz is the second largest city in Austria and the capital of the province of Styria with about 300.000 inhabitants.

Since June 2010 a so called passenger portal is in place. It is a one stop shop for passengers to get in contact with the QM-system, with a telephone portal that incorporates both information provision and complaint management. They have the policy

¹ <http://www.menosumcarro.pt/>

of giving an answer to the request in a maximum of 3 days. A motto is “a well handled complaint generates a higher customer loyalty than no complaint”.

In addition a board of customers (so called “Fahrgastbeirat”) is in place.

Moreover, a yearly census researches the performance and the perceived quality of the Holding Graz Linien (telephone interviews plus an online survey).

2.1.5 Athens, Greece

In Athens, the ENERQI quality monitoring is implemented by the Centre for Renewable Energy Sources and Saving (CRESES). CRESES co-operates with the Athens Urban Transport Organization (OASA), the public transport authority of Athens which has the public transports operators (STASY S.A. and OSY S.A.) under its supervision and is responsible for planning, monitoring and control of all public transport modes in the city (metro, bus, trolley, railway, tram).

To this date, in the context of the ENERQI project, the Greek pilot action covers all modes of public transport (three metro lines, one tram line, one trolley line, the urban part of the suburban railway and twenty four bus lines). Since the monitoring system used in the ENERQI project is dynamic, it allows addition of new lines to be monitored at any time.

The public transport network used in the project covers most of the Athens metropolitan area which is densely populated ($\approx 4,5$ million inhabitants) and has a relatively high percentage of public transport use ($\approx 35\%$).

The customers' segmentation of those who are using the Public Transportation in Athens is considered rather typical: 76% of the passengers are using public transport to go to work, 36% for entertainment purposes, while 45% of the passengers use the public transport modes for social activities. According to the data obtained from a recent survey, 55% of the students prefer the Public Transportation comparing to the private vehicles while 45% of the retirees are using PT. 43% of the PT customers are using the PT daily or almost daily, 32% one to two times a week and 25% less than once a week.

The improvement and communication of quality has been on the top of OASA priorities during the last few years. Indicatively:

- In 2011, OASA became one of the first public entities to own the Certificate of Installation and Implementation of the Quality Management System according to ISO 9001:2008. The system includes among others the management of passengers' complaints.
- OASA focuses on better service for cyclists. The transfer of bicycles into public transport vehicles is allowed and also bicycle parking infrastructures are provided at some new metro stations.
- Since 2011, Google Transit (web application for searching the optimal route by using public transport means) is implemented. The service can be used by passengers or

generally anyone interested for free and it is accessible by any personal computer, smart phone, etc. with internet connection.

- OASA strongly supports the improvement of the quality of environment in the greater Athens area. In this context, the urban transport system has replaced all buses and trolley buses, with new environmental friendly vehicles.

In order to evaluate the customer satisfaction and monitor the views of costumers on the quality of the public transport provided, OASA performs regularly surveys. These customers' surveys provide detailed information on the areas where corrective actions should be taken for improving the quality of the services rendered. The public transport operators take into consideration the results of the surveys and proceed to the implementation of the appropriate measures in order to improve the customer satisfaction.

2.1.6 Lancashire, United Kingdom

In Lancashire the monitoring is being carried out through Lancashire County Council in partnership with Transdev Burnley and Pendle. Public Transport in the UK, on the whole, is provided by commercial operators who are free to revise their networks as they require by providing a notice period of 56 days. Additional services, for example some evening or Sunday bus services that are not commercially viable are provided under a tender/contract basis to the local authority (LCC).

Burnley is an authority in East Lancashire that covers 111 square kilometers and in 2010 had a population of 85,300. The number of people per km² is twice the England and Wales average. In common with other areas of East Lancashire, Burnley faces a number of economic and social challenges, the long-term decline in manufacturing employment; population loss due to outward migration; the quality of the housing stock and high levels of deprivation.

Pendle is an authority in northern East Lancashire that covers 169 square kilometers and in 2010 had a population of 89,300. Pendle is a district that has similar problems to other East Lancashire authorities. The large amount of old terraced property subdues average house prices and contributes to high rates of unfit housing. Employment and population growth are other areas of concern along with pockets of severe deprivation. The area does however have some real strengths and the local economy derives enormous benefit from the aerospace sector which is a source of high value employment.

Transdev Burnley and Pendle is a major provider of bus services within the Boroughs of Burnley and Pendle, with links to and from Manchester, Accrington, Clitheroe and Keighley.

Transdev Burnley and Pendle operate approximately 22 separate bus routes/services in and around the Burnley and Pendle area. These are a mixture of dense urban and inter urban routes plus a number that serve some of the rural areas that then link into the urban network. The buses on the services are a mixture of high quality easy access single and double deck vehicles and are mostly route branded for ease of customer identification.

The predominant markets are for commuting and shopping with leisure use also quite popular. All Trandev Burnley and Pendle drivers and staff undergo regular customer awareness focused training. Trandev Burnley and Pendle manage their fleet of vehicles through GPRS vehicle tracking.

2.1.7 Alba Iulia, Romania

STP is a private Romanian company that provides public transportation in two cities from Transylvania (Romania): Alba Iulia (Alba County) and Turda (Cluj County). During the last years, STP has tried to increase the standard of the local transportation to a "21st century" level in a country where, not many years ago, PT used to be a nightmare for citizens. In Alba Iulia, STP transports 29.000 passengers every day, almost half of the total population (Alba Iulia has 66.000 inhabitants). Most of them are workers, pupils, students and seniors. There are 25 routes covering the entire city and the outskirts.

The improvement of quality has been the most important target for the company in the last few years. STP uses approximately 90 buses in Alba Iulia, most of them not older than 5 years. The buses have a reduced impact on the environment and are equipped with air conditioning and supplementary heating systems. The buses are also equipped with GPS, which allows STP to use a fleet management and dispatching system. Therefore, the traffic charts are precisely observed and the traveller waits less time in the stations.

STP developed an integrated traffic monitoring system on all vehicles and on all routes, which consequently can be localized in real time on the digitalized map of the entire park. The operator built his own fuel station and has one of the most modern car wash, which ensures transportation exclusively with buses washed twice a day.

Display boards with real arrival time can be found in most stations, and inside the vehicles there are dynamic display systems as well, where both the current and the next stations are announced. These facilities are doubled by the vocal announcing of the lines and stations, both in the stations and inside the buses.

The travellers can choose between the classic paper tickets or the electronic ones, or they can benefit from card subscriptions, gratuities and electronic wallet. As an addition to the cards, Alba Iulia is the first city in the country where there is a possibility to pay the ticket via SMS, which remains valid for an hour.

In order to monitor the satisfaction of costumers on the quality of the provided public transport, STP has been doing regular customer surveys. There is also a green line where the clients can contribute to quality improvement. Due to the importance of public transport quality for STP, the ENERQI method seems to be the most important tool to adjust the measures taken to improve the company`s services.

2.1.8 Plovdiv, Bulgaria

The city of Plovdiv has five transport operators that cover its entire area and partially the outskirts. Some of them offer their service in the suburbs and have fleets in other Bulgarian cities as well.

EAP collaborates with the private local bus company HebrosBus that owns the largest bus fleet among the Plovdiv transport companies. It serves 11 of the 37 public transport lines in the Plovdiv public transport network with over 121 buses and personnel. It covers app. 101 980 km²; and the modal split is 37% in favour of the public transport usage. The main customer groups are students, retired people and workers. In total for the four lines, 295 000 tickets are sold monthly. The passengers with travel cards cannot be estimated as active flow.

The test site in Plovdiv covers four lines of the network with the greatest passenger flow and coverage. Moreover, these are representative lines for the entire municipal passenger traffic. The average frequency of the four lines is 10 minutes and the total travel time is 45 minutes, as the travels are made with an average speed of 25 km/h. On an occasion of delay, it is app. 3-5 minutes. Over 50 of the buses used are on methane and have less than 5 years of exploitation.

HebrosBus has an integrated management system (IMS) and has adopted and updates the ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 quality standards. A survey conducted by EAP and HebrosBus in May 2011 among 900 customers of the PT network gave a good background information on the quality of the service provided. The general satisfaction of the passengers with the service is 76% in May 2011, and 21% of them have found it satisfactory in most of the cases. Only 1% disagrees that the offered service quality is good.

The collaboration with HebrosBus will ensure maximum coverage of the costumers' view and perception on the quality of the public transport, and will provide a better understanding of the relevant transport situation. Therefore, the objective of the project to observe and improve the quality of the public transport service will be reached directly from customer observations. Raising awareness on the schemes for improving the public transport service will be done on four levels – public transport operators, customers and non-customers, stakeholders and followers.

2.2 Overview of local context

Context is rather different in the various ENERQI sites. Urban density, local modal split, the passenger segments covered by the services, the pre-existent PT level of quality and the related expectations by costumers vary a lot. These issues significantly motivate the approaches followed in each site, partly determine the local specific objectives and influence results of quality measurements.

Table 1 – Local context and pre-existing quality aspects

Site	Urban density of the PT operations area *	Modal split Modal PT share in the area	Fleet age Average age of fleet (years)	Speed Average commercial speed (km/h)	Frequency Average frequency (circulations / hour.line)	Passenger satisfaction Average costumer satisfaction**
NL Noord-Brabant	Low	3%	4	NA	2	7,0/10
FR Toulouse	High	65%	1 (tram) 9 (metro)	20 (bus) 19 (tram) 33 (metro)	NA	90/100 (metro only)
PT Lisbon	Very high	32%	7 (bus) 16 (tram)	15 (bus) 10 (tram)	5	67/100
AT Graz	High	20%	8 (bus)	17 (tram) 22 (bus)	12 (tram) 10 (bus)	6.3/10
GR Athens	Very high	35%	9 (average of means)	18 (average of means)	NA	-
UK Lancashire	Low	8%	7	23	NA	-
RO Alba Iulia	Average	NA	5	29	20	84,2/100 (2011)
BG Plovdiv	High	37%	5	25	7	76/100

* Qualitative scale on basis of subjective comparison between sites

**Based on different types of surveys

The areas covered by the transport operators range from very dense urban areas (Athens, Lisbon) to low density regions (Noord-Brabant, Lancashire). Density and propensity to use other modes (like cycling in the Netherlands) also implies differences in terms of modal share of PT, which ranges from 3% in Noord-Brabant to 65% in Toulouse, with obvious implications for the segments of costumers covered, which range from strictly captive segments (Noord-Brabant, Lancashire) to nearly all segments of the population (Toulouse, Graz, Lisbon).

Some indicators of pre-existent quality that are widely available are fleet age, speed, frequency or passenger satisfaction ratings. All operators have at least reasonably new fleets; the exception of the Lisbon trams is due to the inclusion of a significant old fleet of historical nature. The future tendency in this aspect might be for fleet age to increase due to the economic crisis, particularly in the most affected countries. Average speed practised varies significantly, depending mostly on the urban density of the areas and on the density of stops and the availability of dedicated corridors from PT. Frequency of service is also mostly influenced by the density of the area although an important factor is the structure of the network, which is in some cases based on a lower number of lines covering higher shares of demand (e.g. Alba Iulia), and other by higher number of lines with lower frequencies (e.g. Lisbon). The perceptions of the costumers also present major differences: Toulouse is the place with better quality perceptions, which is totally in line with the very high level of PT use in that city, but also may be related with the recent

upgrades of the PT system. Lisbon is the case with lower ratings, although there has been an impressive increase in quality perceptions in the last years (from 54,2 points in 2005 to 67,7 in 2010).

2.3 Implementation issues

The ENERQI Guide for implementation of customer based quality observations suggests six main steps for the setup of a local scheme:

1. Defining objectives
2. Choosing targeted services
3. Defining perceived quality indicators
4. Survey design and assignment
5. Constitution of the observers' panel
6. Database and management system development

Within ENERQI, steps 3 and 6 were mostly a common task. Concerning the other steps, different approaches were taken in the various sites. The table below summarizes them.

The priority **objectives** behind the application of quality monitoring may vary across sites. First of all they depend on the type of entity interested in doing the monitoring, which may be directly interested in increasing the number of costumers or simply in assessing quality of service to address the needs of current costumers. Transport operators are typically interested in increasing costumers to increase revenues or, in case they are a public entity, in fulfilling sustainability objectives directed by their public owner. This is not always the case; for example in the Netherlands the operators revenues do not depend on demand since they are paid on the basis of availability, and the interest of increasing demand and quality lies more with other stakeholders including public bodies and passenger associations, while quality monitoring is enforced by local regulations. In cases where the quality monitoring initiative comes from entities that are not operators, the priority objective may be simply assessing the quality itself. This is the case of Lancashire, where the local public authority is interested in evaluating the level of service delivered by the local private operators. As described in the ENERQI Guide, different objectives may have different implications regarding the optimal design of the scheme.

All sites generally targeted the whole of the PT networks in question. Although there are several possible reasons for limiting the monitoring to a given set of the network, none of the sites found them determinant for such except Plovdiv which focused on 4 bus lines. This may partly be explained by the observer recruitment approaches which in many cases have used recruitment communication channels which are horizontal to the whole networks. This approach also makes sense due to inexistence of previous knowledge on general figures of quality perceptions at the network level; only after obtaining global

information on quality at the network level may it make sense to depart for more detailed levels of information at the level of specific lines or services².

Likewise, all sites focused on all customer segments indiscriminately. This makes sense mostly for resource efficiency reasons, since in general the recruitment approaches would be less effective in recruiting volunteers if they were to be directed at specific customer groups. On the other hand, it could make sense to target to specific groups with higher quality sensitivity in those places where the main goal is to increase number of costumers³.

All sites are aiming to carry out monthly observations, although some sites are following a continuous, uninterrupted, approach. In several cases, observers are asked to send regular surveys at their own criteria in terms of regularity and services covered. This approach has the advantage of allowing gathering a higher number of observations but as a negative consequence may bias the sample of observations towards factors related to the reasons behind observers' choices of trips to report⁴.

In terms of physical means of reporting, part of the sites rely exclusively on observations reported in the internet (Noord-Brabant, Toulouse, Lancashire, Athens), while other recurred also to paper surveys (Graz, Alba Iulia, Plovdiv) or telephone interviews (Lisbon). Generally, the later option was chosen in sites where the internet penetration is lower among important regular customer segments. In sites where only internet was used, there is a risk of bias towards the opinion of segments that use the internet, a risk which may be fully justified by the resources saved in the process of gathering observations.

² ENERQI Guide (Deliverable 3.2), p. 11.

³ ENERQI Guide (Deliverable 3.2), p. 16.

⁴ ENERQI Guide (Deliverable 3.2), pp. 14-15.

Table 2 – Summary of major implementation approaches across sites

Site	Local operator(s)	Main top objectives of quality monitoring	Targeted services	Surveys		Targeted customer groups	Observers Number recruited (April 2012)	
				Timing	Format Internet, paper, phone			
NL	Noord-Brabant	Arriva and Veolia Transport Brabant	Increase the PT usage, improving perception of quality by customers	All bus lines	monthly	internet	all customers of Veolia and Arriva	600
FR	Toulouse	TISSEO	Improving perception of quality by customers, Increase satisfaction of customers	All metro and tramway lines 20 bus lines (1st step), then all bus lines	Monthly	Internet	All customers	440
PT	Lisbon	Carris	Increase costumers, Evaluation of actions	All services (bus, tram)	monthly	Phone, Internet	All costumers (with bias for internet users)	500
AT	Graz	Holding Graz Linien	increase quality of service	All services (bus, tram)	ongoing	Paper, Internet	All costumers (with bias for internet users)	336
GR	Athens	OASA	Increase number and satisfaction of costumers, Services' quality improvement	All services (bus, metro, railway, trolley, tram)	monthly	Internet and paper	All costumers	102
UK	Lancashire	Transdev Burnley, Pendle	Information regarding customers perception of quality of PT service/network in area	All Transdev B & P bus services.	Individual responses as frequent as possible	Internet	All customers of Transdev B&P	65
RO	Alba Iulia	STP	Evaluate the clients' satisfaction Increase customers	All lines (bus)	monthly	Mostly paper	All customers	360
BG	Plovdiv	Hebros Bus	Improving quality, Introducing customer-oriented monitoring	4 urban bus lines	monthly	Internet, Paper	All types (students, retired, workers)	160

2.4 Quality improvement measures foreseen

The actions foreseen which will affect quality can be divided into three categories:

- Planned actions in pipeline during the period of monitoring
- Actions made in response to results of quality monitoring
- Unplanned actions due to external circumstances

In the beginning of the project, most partners had planned quality improvement actions in the pipeline that could be evaluated through the ENERQI approach in terms of its effects on quality perceptions. Additionally, it is foreseen that relevant monitoring information may trigger the realization in the short-term of unplanned actions in response to customer needs or problems raised by the observers. These are typically actions that do not require significant expenses and that therefore can be integrated in the regular operational activities of the organizations. Finally, another type of unforeseen actions is expected as cause of external events which imply changes in the services provided. During the period in question, the most relevant effect has been the present economic crisis which generally triggered a contraction of regular expenses and investment in relation to formerly planned.

A description of the measures foreseen and situation in each site is provided in the following sections.

2.4.1 Brabant region, The Netherlands

Most of the improvement actions are focussed on increasing the satisfaction levels of customers through driver's training on hospitality. Furthermore a lot of effort has been put by the Province in increasing the (real-time) travel information for travellers. All major bus stops are equipped with Dynamic Traveller Information Systems based on gps-tracking of the busses.

Several marketing campaigns have been conducted to attract new and specific target groups like senior citizens or daily commuters. These marketing campaigns have been executed by the Province and in some cases in corporation with the operator. The actual contract between the transport authority (the Province of North Brabant) and the transport operators Veolia and Arriva is a so called cost based contract. This means that the main criteria of performance for the operators are the costs paid for the services they deliver. Therefore, the improvement of the level of service not defined in the contract is not rewarded. The present contract will be revised in 2014. Lessons learned of other cost based contracts in Europe show that a cost based contract is not always the best way to improve customer perceived quality levels.

2.4.2 Toulouse, France

The ENERQI project allows Toulouse network to assess the perception of the actions set up in order to improve the network quality. During the ENERQI project, those actions are focused on several themes:

- Regularity and punctuality on bus lines;
- Visibility of Tisséo staff on the network;
- Perceived fraud by users.

Those themes have been identified following the achieved results during quality measurements on regularity and punctuality (Quality department of Tisséo) and the barometer Image satisfaction (Marketing department of Tisséo). Data collected thanks to the ENERQI process will allow checking if corrective actions set up by the related departments produced the expected effect. Feedbacks from users will be taken into account by the Quality department and the Marketing department of Tisséo within the evaluation of the effectiveness of corrective actions deployed. It is scheduled that the process between both departments will be consolidated before ending 2012.

2.4.3 Lisbon, Portugal

Foreseen quality improvements in Carris during the ENERQI monitoring include mostly soft measures. Training of drivers is carried out on a regular basis and its results will be monitored in specific cases. An onboard internet service (the "Netbus"), presently implemented in two lines, is foreseen to be extended to the whole network. Fleet renewal is not foreseen, but there may be changes in allocation of vehicles per different lines which will be interesting to analyse. Besides that, regular communication campaigns could have effects on perceived quality.

Given the present situation of economic crisis in Portugal, which is imposing urgent cost reduction and revenue increase in all public sectors including transport operation, it is likely that major network changes will take place during 2012 and 2013. From this perspective, the realization of quality monitoring will be useful also to assess the effects of these changes on customer satisfaction. The goal of Carris and the national Government is presently to maintain quality while highly reducing costs. This project may be an opportunity to assess the achievement of that goal.

2.4.4 Graz, Austria

At Holding Graz Linien all the defined "alert" questions⁵ are dealt with. If the issue can be dealt with *ad hoc* then it is done so, like repairing or cleaning of litter or broken vehicles and stops, staff misbehaviour or other issues like information provision etc.

⁵ "Alert questions" are a set of questions that are presented on the start-screen in the questionnaire tool.

If the incident is a lack in quality like for example delays or broken connections the reason is explained and if possible precautions are undertaken to avoid such incidents in the future.

In any case the ENERQI-tester gets feedback to each of the alert questions from the customer care centre of the operator.

2.4.5 Athens, Greece

CRES believes that the ENERQI monitoring will reveal quality issues which can be improved by easily implemented, soft and low cost actions. Indicatively, some quality improvement measures could be the following: the time schedules could be updated and communicated to the public in combination with route maps, the training of drivers could also take place with focus on today's needs (i.e. provide passengers with more accurate information about interchanges, take care of cyclists, etc.), better management of ticket sales, etc.

In Greece, the economic crisis has led to strict measures which imply urgent horizontal cost reduction of the public sector including transport. It seems that during the next few years great changes will take place (i.e. possible privatization, change of routes, change of fares/tickets, etc.). Despite those measures, the public sector including OASA tries to maintain and improve if possible its quality of service, while at the same time reduce expenses. Consequently, it is very important to be able to provide and establish a tested quality management system methodology along with these changes that may come in the near future, as well as to know *a priori* the needs and expectations of passengers, in order to take them into account and include them in any potential modifications.

2.4.6 Lancashire, United Kingdom

Over the project monitoring period Transdev Burnley and Pendle will make the following quality improvements that will be monitored throughout the EnerQI project.

Local bus stop information will be revised and updated during the second quarter of 2012. This information will be made clearer to read and understand and will feature more network branding and advertising information.

Two new Optare Versa low floor easy access buses will be introduced into the fleet in April 2012. These buses will serve the towns of Burnley and Nelson and will form part of the operators 'Starship fleet'.

In the final quarter of 2012 the fleet of high quality double deck buses used on the 'Witch Way' services, operating between Nelson, Burnley and Manchester will be replaced with a fleet of new vehicles. This introduction of new buses will be complimented with an appropriate marketing and communications campaigns.

One of Transdev Burnley and Pendle's main services is the 'Main Line' network covering the inter urban areas throughout Burnley and Pendle Districts and beyond. 2012 will see the introduction of 3 or 4 refurbished buses for extensions to the routes.

There will be marketing campaigns for the Starship network for its extension to Bury in April along with a new campaign for the Witch Way in late Spring with changes to service frequency and the introduction of the Witch Way app. Ad hoc campaigns will take place for a leisure bus service, Dalesbus and the Main Line service frequency improvements in April.

It is also hoped to launch mobile ticketing in September or October 2012 and the Enerqi monitoring of customers perceptions will form a valuable part of the marketing mix.

2.4.7 Alba Iulia, Romania

Because of economic context, STP cannot plan any new important short-term investments. The quality improvements will be focused on driver behaviour, better information available for the customers in the buses and in the stations, and a professional map covering all the network will be done as an important communication instrument (the new site is already done). The ENERQI instrument will help us to design the future marketing campaigns to increase the number of satisfied passengers.

2.4.8 Plovdiv, Bulgaria

HebrosBus and EAP plan mainly soft measures for implementation of improvements. They will be determined after in-depth analysis of the surveys. However, for now certain demands have been identified – security and safety issues, drivers' training, information management and raising awareness and passenger information.

Even though the drivers have undertaken training in safe and vehicle-friendly driving, it is a constant necessity to update the knowledge and know-how of the newly employed drivers. Moreover, the surveys clearly state the customers' concern for their safety on board.

Another similar issue is the personnel's' behaviour and their professional attitude. Passengers are satisfied with the Personnel information support, but it is noted that there might be a gap in the emergency procedures and actions.

There is a lack of information on the bus stops, which can be easily compensated through communication and raising awareness on-board and off-board the vehicles. Measures related to vehicle timetables, web-site information updates, dissemination of paper booklets with timetables and routes are foreseen.

Information on questions that cannot be addressed directly by the transport operator will be kept as evidence for the local authorities that there is a shift in the customers' demands; and based on it, future updates in the Plovdiv public transport can be made. The data gathered will also serve as a benchmark data.

HebrosBus and EAP have planned strong dissemination campaign among the two vast customer groups – students and retired people – whose opinion of the public transport sets the trends. Regular communication events will be held.

It is planned that the ENERQI approach to quality management is established as a major quality monitoring and improvement instrument in the actions for improving the local transport services. The continuous monitoring process is a source of constant “real-time” information on the customers’ satisfaction and will help regulating the improvement actions of the public transport operators. As a pioneer in ENERQI and a transport operator facilitating other public and intercity transport networks in Bulgaria, HebrosBus along with EAP experts will disseminate the results from the survey and its impacts on the local transport and the local community. It is foreseen that operators from the region will be interested as followers.

3 QUALITY PERCEPTIONS

This chapter describes and compares results of quality perceptions in the ENERQI demonstration sites. The comparison of aggregate indicators per sites allows identifying common patterns and differences across countries. This provides additional insight on various local characteristics and suggests useful lessons for a better interpretation of quality monitoring results.

3.1 Results on quality perception indicators

The results on quality perceptions across the various ENERQI sites are presented according to the quality criteria in public transport established by EN13816:2002.

As discussed in the ENERQI Guide, the monitoring based on costumers' observations focuses on specific trips and therefore the indicators should in general be related to characteristics of individual trips rather than general characteristics of the services in question. The European Standard EN 13816:2002 includes eight groups of indicators. However, not all of them are relevant from the perspective of specific trip monitoring. The following figure presents a subjective view of their general positioning concerning relevance towards trip specific performance and perceived quality of service. The issues evaluated in the ENERQI monitoring are mostly related to the quality aspects of Information, Time, Costumer care, Comfort and Safety and Security.

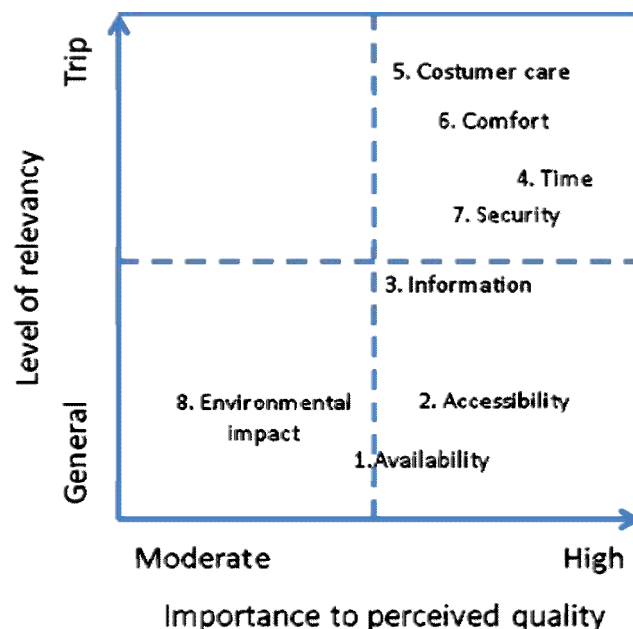


Figure 1 – Classification of groups of indicators proposed by EN 13816:2002 according to their importance towards specific trip performance and customer perceived quality (Source: ENERQI Guide)

The monitoring in ENERQI was made in various sites which adopted a common questionnaire and evaluation approach, for comparability purposes. The common questions are each associated with one quality criterion. The following table presents the common ENERQI questions and their allocation to the five related quality criteria of EN13816:2002.

The results are presented and compared in terms of the quality criteria of EN13816:2002. The classification of each criterion is calculated as an average of the classifications of the various questions associated with it.

Table 3 – Relation of ENERQI common questions with EN13816:2002 quality criteria

Common questions:	Overall quality	Information	Time	Customer service	Comfort	Safety / Security
Overall customer satisfaction How satisfied are you in general with the service offered to you?	rc					
Value for money, tickets and tariffs How do you judge the value for money (price/ quality) of this service?	r					
Level of crowding How satisfied were you with any crowding at your boarding stop(s)? How satisfied were you with any crowding on the vehicle?					rc rc	
Safety and security How satisfied have you been with your personal safety on the vehicle (s)? How satisfied have you been with your personal safety at the stop(s)?						rc rc
Stops/shelters How do you judge the condition of the (bus) stop environment on departure (s)? How satisfied have you been with the punctuality of the departure? OR (in case of an offered frequency) How satisfied have you been with the reliability of the service? How do you judge the conditions of the (bus) stop environment on arrival?			rc rc		rc r	
Vehicle condition How do you rate the condition of the vehicle (s)? How satisfied have you been with the comfort in the vehicle(s)?					rc rc	
Journey speed How satisfied have you been with the duration of your trip?			rc			
Staff service How satisfied have you been with the friendliness and the overall behaviour of the driver (s)? If you asked for information / advice, how satisfied have you been with the information given by the driver (s)? How satisfied have you been with the driving style of the driver (s)?				rc r		rc

Common questions:		Overall quality	Information	Time	Customer service	Comfort	Safety / Security
Information							
How satisfied have you been with the information at the stop(s)?			rc				
How satisfied have you been with the information in the vehicle?			rc				
Disruption/ incidents							
In case of disruption, how satisfied have you been with information regarding the disruption and possible solutions?			r				

Legend: r – related to criterion; c – used in criterion classification calculation

3.1.1 Results per quality criteria

The observation of results per quality criteria allow to compare the evolution and finding regularities across sites in terms of each quality criteria. The following table presents the average of the results in all sites per quality criteria. EnerQI has used a 1 to 5 satisfaction scale.

Table 4 – Global average results per quality criteria

Quality criteria	Rating
Overall quality	3.82
Information	3.65
Time	3.87
Customer service	3.90
Comfort	3.72
Safety/ security	3.85

An average overall quality result of 3,83 could be interpreted as that people perceive the quality of the public transport operations to a reasonable to good standard on average. Customer service and time are perceived on average as the best aspects of the trip, while information and comfort are the worse. Although the difference between the lowest and highest rated criteria is relatively small (0.26 points), the fact the sample includes a big variety of sites indicates that there is a global pattern in these rating differences.

The figure below presents the overall quality satisfaction results and the specific results for each relevant quality criterion and in each country. The relatively stable results in the period of observations in most sites could be interpreted as a signal that the samples used are generally high enough to have a statistical significance of the results. On the other hand, they are an expected result considering that there haven't been significant quality changes in the period concerned.

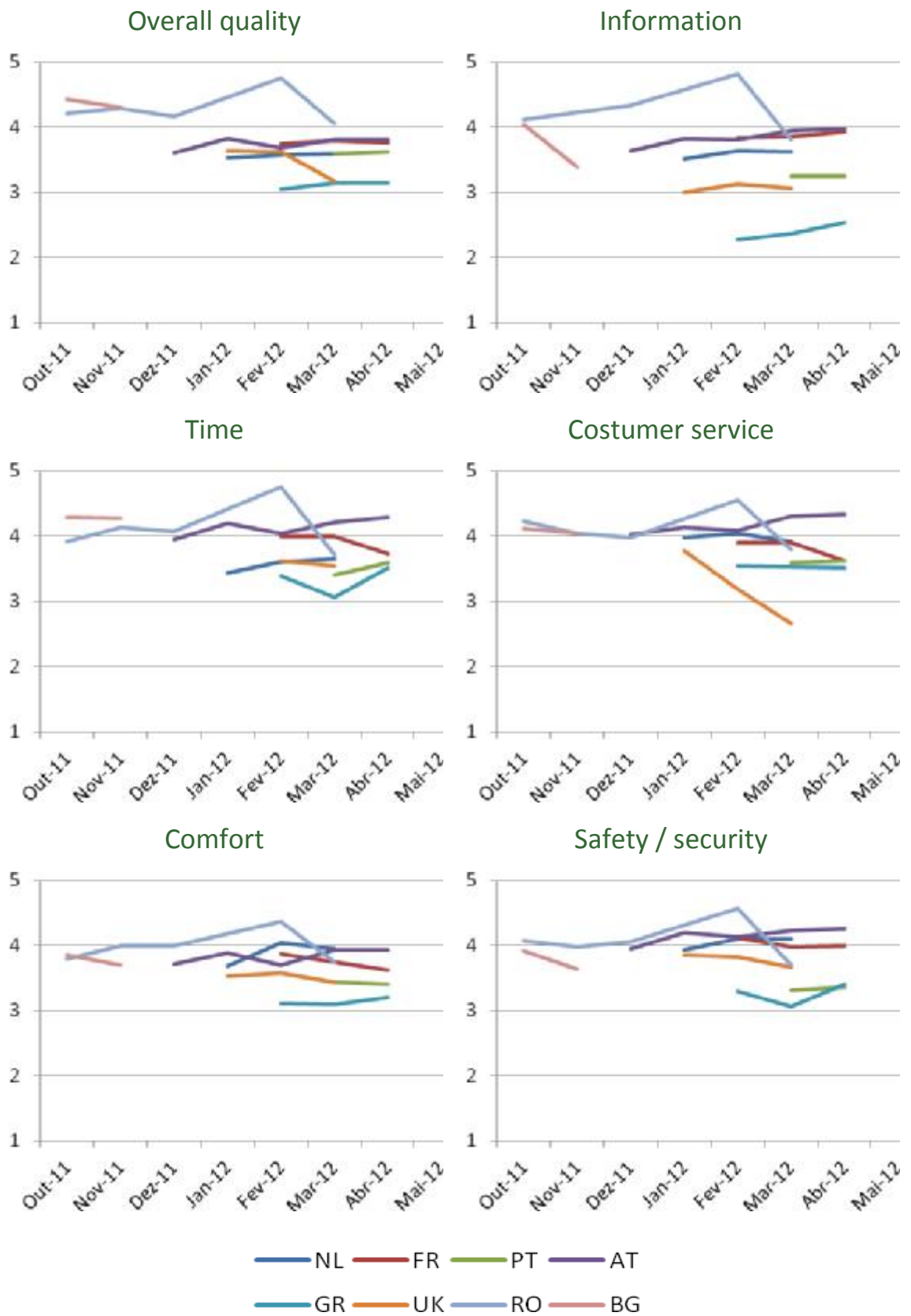


Figure 2 – Overall results and results per quality criteria

3.1.2 Results per site

The following table presents the overall quality satisfaction results per site:

Table 5 – Overall quality satisfaction per site

Site	ENERQI Rating
Noord Brabant, NL	3.57
Toulouse, FR	3.77
Lisbon, PT	3.63
Graz, AT	3.74
Athens, GR	3.10
Lancashire, UK	3.50
Alba Iulia, RO	4.22
Plovdiv, BG	4.34

Plovdiv and Alba Iulia are the places where satisfaction is reported to the highest level. In Athens observers are reporting the lowest level of satisfaction. The positive results of Plovdiv and Alba Iulia might well be related to positive quality aspects of their public transport networks. Indeed, they report comparatively good levels of speed, frequency of lines and modernity of vehicle fleets.

However, comparison of satisfaction ratings across different sites cannot testify for local differences in absolute delivered quality of service. As theoretically justified by Kahneman and Tversky⁶ and empirically shown by Easterlin⁷, the satisfaction of individuals is evaluated against a reference standard or norm. As this reference adapts to context and expectations, so does the evaluation of satisfaction.

In the scope of public transport, this kind of subjectivity of reported satisfaction and a non relation to delivered quality across sites has been reported before by Friman and Fellesson on the basis of quality satisfaction data in various sites⁸:

“a high level of satisfaction does not necessarily indicate an objectively “better” system and vice versa. Instead, satisfaction scores should be interpreted in their wider context, thereby enabling a further contextualization of the objective conditions as well. This is particularly important when comparisons are made between different cities: satisfaction is a relative concept and not a measure of absolute success in public transport. Understanding—rather than taking for

⁶ Kahneman D, Tversky A (1979) “Prospect Theory: An Analysis of Decision under Risk”, *Econometrica*, Vol. 47, No. 2. (Mar., 1979), pp. 263-292.

⁷ Easterlin R A (1974) "Does Economic Growth Improve the Human Lot?" in Paul A. David and Melvin W. Reder, eds., *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, New York: Academic Press, Inc.

⁸ Friman M, Fellesson M (2009) “Service Supply and Customer Satisfaction in Public Transportation: The Quality Paradox”, *Journal of Public Transportation*, Vol. 12, No. 4.

granted—the links between satisfaction and an objective service supply is a key management challenge”

Looking at the results for instance of Plovdiv and Alba Iulia, it might be that recent quality improvements against a standard of recent lower quality level causes a higher perception of present quality.

The phenomenon of expectations adapting to delivered quality can also be tested by comparing perceived and delivered quality in different lines or services within the same site. In Lisbon, a regression test comparing perceived and delivered quality in terms of occupancy rates and speeds of different lines resulted in a statistically non-significant relation in both tests⁹. The fact that costumers using lines with distinct occupancy rates or speeds do not rate their satisfaction accordingly can be interpreted as a sign that users have adapted their expectations to the bus lines they normally use.

Another aspect that may influence differences of subjective assessment within local sites is cultural aspects that influence the reference standard. People in different countries report levels of satisfaction to life that are not explainable by economic or social aspects. It is interesting to compare satisfaction reported within ENERQI with general satisfaction to life as reported by the Euro Barometer¹⁰.

Table 6 – Comparison between ENERQI overall quality satisfaction rating with Life satisfaction ratings across sites

Site	ENERQI Rating	Life satisfaction
Noord Brabant, NL	3.57	2.44
Toulouse, FR	3.77	1.96
Lisbon, PT	3.63	1.45
Graz, AT	3.74	2.03
Athens, GR	3.10	1.55
Lancashire, UK	3.50	2.23
Alba Iulia, RO	4.22	1.37
Plovdiv, BG	4.34	1.15

Contrarily to what one would expect, there is a negative correlation (-0.48) between the ENERQI results on quality satisfaction and the reported life satisfaction in the correspondent countries. However, if the outstanding cases of Romania and Bulgaria are excluded (which in complete opposition to the ENERQI results, feature the worst ratings in life satisfaction) from the analysis, the correlation becomes positive (0.33). In fact the very

⁹ The tests compared the ENERQI satisfaction ratings during the months of March and April 2012 with the real average occupancy rate and speed per line that took place in June 2011. The t-ratio for the tests on occupancy rates and speeds were respectively 0.30 and -0.33.

¹⁰ See e.g. Walsh B (2012) “The Influence of Macroeconomic Conditions and Institutional Quality on National Levels of Life Satisfaction”, UCD Centre for Economic Research, Working Paper Series, WP12/08, March 2012.

positive result of Alba Iulia and Plovdiv might well be the result of a generally lower level of expectations within those countries such that the provision of a reasonable level of public transport will be comparatively highly appraised by the customers.

The fact may represent a particularly good opportunity in these countries to promote public transport towards potential customers who are not public transport users and are not aware of the presently delivered quality¹¹. The potential impact of such communication campaigns in relation to their expectations could be particularly high.

Another aspect that is also useful to compare is the ENERQI overall satisfaction ratings with previous results on satisfaction in the same sites¹². Several sites have recently carried out user surveys on satisfaction level in the recent past. The comparison of results shows consistent similarities between the ENERQI measurement and previous results, with the exception of Graz. On the other hand differences in results are normal considering the existing differences in scale of measurement and also the fact that the ENERQI approach focuses specifically in operational aspects of PT provision and not in other more static quality aspects related to structural issues of the PT network.

Table 7 –Comparison of ENERQI results with previous customer satisfaction surveys

Site	ENERQI Rating	Previous results		Variation
		original scale	1-5 scale	
Noord Brabant, NL	3.57	7,0/10	3.67	-3%
Lisbon, PT	3.63	67/100	3.69	-2%
Graz, AT	3.74	2.7/5	2.70	39%
Alba Iulia, RO	4.22	84,2/100	4.37	-3%
Plovdiv, BG	4.34	76/100	4.04	7%

The following figure presents the results of the various quality criteria in each site. A general observation is that the various quality criteria follow similar trends through time, indicating that exogenous factors are being responsible for variations in perceived quality, although in sites with lower samples it might be strongly affected by outliers.

¹¹ A good example of such an attempt is the recent campaign in Alba Iulia, the “Revolution Bus”, where a bus from before the revolution of 1989 was put into circulation to remind people of how public transport used to be.

¹² Various sources: As reported by the EnerQI sites within the Project.

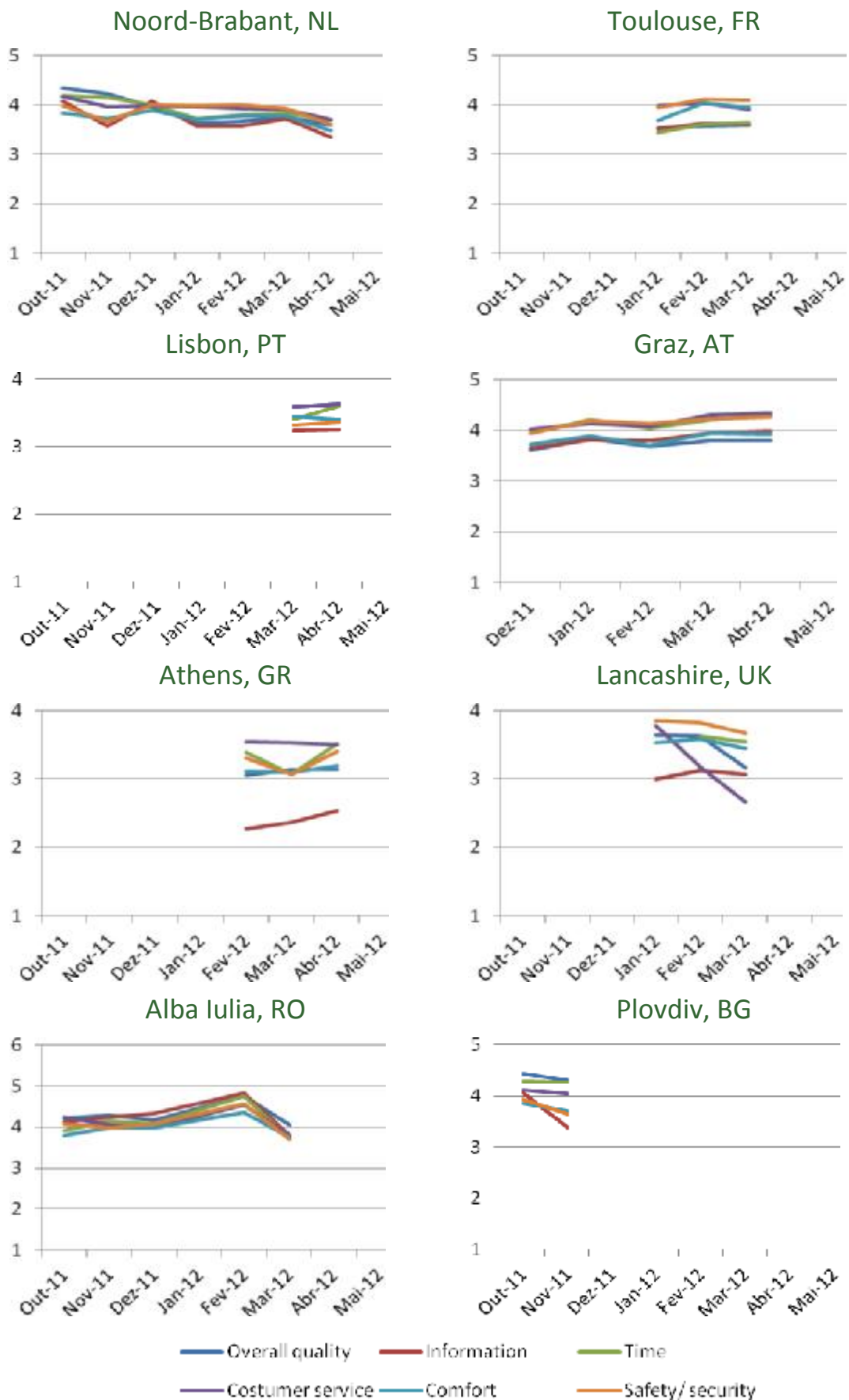


Figure 3 – Results per site

3.2 Quality perception essentials

The following graphic and table detail the results of the question “Which were the items that influenced your opinion most?”¹³ This question was meant to evaluate which quality aspects are most important for costumers.

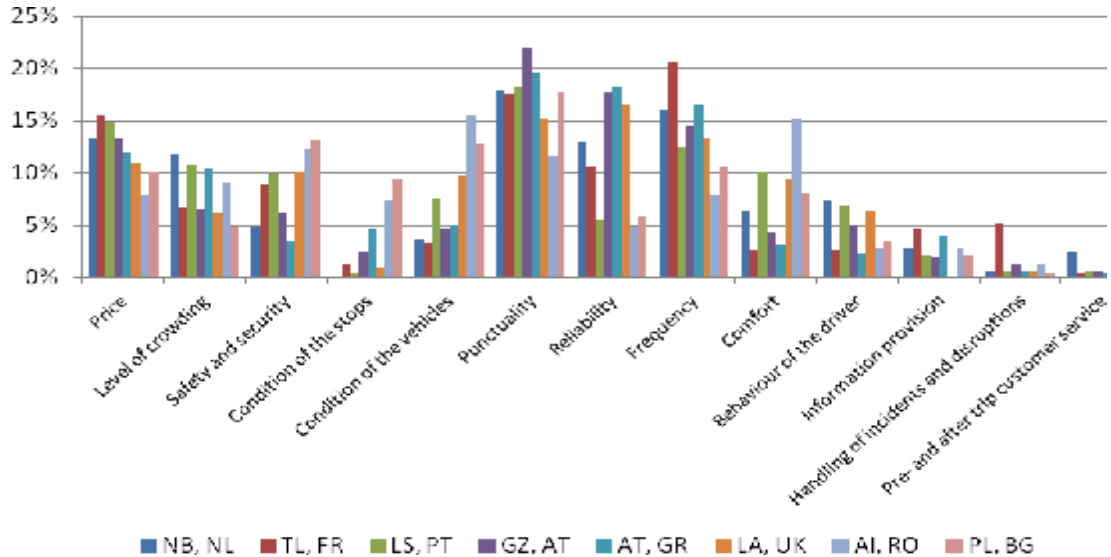


Figure 4 – Most important quality aspects for costumers

Table 8 – Most important quality aspects for costumers (percentage of responses)

	Price	Level of crowding	Safety and security	Condition of the stops	Condition of the vehicles	Punctuality	Reliability	Frequency	Comfort	Behaviour of the driver	Information provision	Handling of incidents and disruptions	Pre- and after trip customer service
NB, NL	13%	12%	5%	0%	4%	18%	13%	16%	6%	7%	3%	1%	2%
TL, FR	15%	7%	9%	1%	3%	18%	11%	21%	3%	3%	5%	5%	0%
LS, PT	15%	11%	10%	0%	7%	18%	6%	12%	10%	7%	2%	1%	1%
GZ, AT	13%	7%	6%	2%	5%	22%	18%	14%	4%	5%	2%	1%	1%
AT, GR	12%	10%	3%	5%	5%	20%	18%	17%	3%	2%	4%	1%	0%
LA, UK	11%	6%	10%	1%	10%	15%	17%	13%	9%	6%	0%	1%	1%
AI, RO	8%	9%	12%	7%	15%	12%	5%	8%	15%	3%	3%	1%	2%
PL, BG	10%	5%	13%	9%	13%	18%	6%	11%	8%	3%	2%	0%	1%
Total	12%	8%	9%	4%	8%	18%	11%	14%	7%	4%	3%	2%	1%

¹³ The question let the respondents select up to three aspects that were the most important for them.

Overall, the most important aspect was punctuality, followed by frequency, price, reliability, safety and security, condition of the vehicles, level of crowding and comfort.

There are clearly similar patterns on how people value the importance of these aspects in different countries. Still, there are relevant differences in what the costumers value the most. Some of the most stringent ones are outlined:

- Price is among the top five of most important aspects in all sites except Alba Iulia. Lisbon is the place where price has a higher relative importance, which is very likely related to the recent drastic fare increases in this site;
- Safety and security is not perceived as an issue in Athens, and to some extent in Noord-Brabant and Graz;
- In Alba Iulia and Plovdiv the conditions of the vehicle and the conditions of the stops clearly have a higher importance than in other places;
- Punctuality is within the top three aspects in all sites;
- Alba Iulia can be distinguished for a lower concern about punctuality and frequency than other sites. This may be because the frequency in Alba Iulia lines is very high;
- In Graz, Athens and Lancashire there is a significantly greater importance given to reliability than in other sites;
- Frequency is the most referred aspect in Toulouse, while in Alba Iulia, where frequency is very high, it is clearly not one of the most important aspects of concern;
- Comfort is an aspect with greater relative importance for costumers in Alba Iulia, and to some extent in Lisbon, Lancashire and Plovdiv;
- In Lisbon, Noord-Brabant, Lancashire and Graz costumers refer behaviour of drivers as an issue of importance above the average. In some of these sites there have been recent training of drivers and these results suggest that their effects might have been noticed by costumers;
- Handling of incidents and disruptions is only perceived as an important issue in Toulouse.

These differences are justified both in cultural preferences and in differences in delivered quality. Regarding the later aspects, there is clearly a tendency of people to highlight aspects where quality is lower. The evolution of the results will allow assessing the kind of volatility regarding what people perceive to be the most important quality aspects.

4 HIGH LEVEL EFFECTS: PT USAGE, ENERGY AND ENVIRONMENT

It will be desirable to assess the actual high level effects that the monitoring approach and related quality improvement measures will have obtained. Particularly, it is relevant to assess the attainment of the strategic goals that resulted in the adoption of the quality monitoring. In the scope of the Intelligent Energy Europe programme, the high level indicators concerned are energy and environmental emissions savings. In what results from the application of the ENERQI approach, the relevant effect bringing benefits in terms of these indicators is shift from private to public transportation.

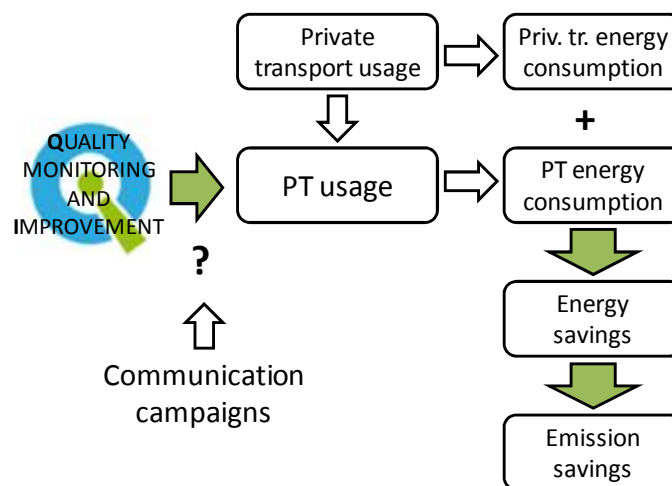


Figure 5 – Effects of the continuous observer based quality monitoring on PT usage and on environment and energy consumption

In this 1st ENERQI Benchmark, a description of the baseline and recent evolution of PT usage in the sites in question is provided. Then a discussion is provided on the ability to assess the effects of quality improvements on the PT adoption. Finally a description in terms of the energy and environmental performance in the ENERQI sites is provided on the basis of the available data.

4.1 PT usage: baseline and recent evolution

The following figure presents the relative evolution of passenger demand in the network of ENERQI sites.

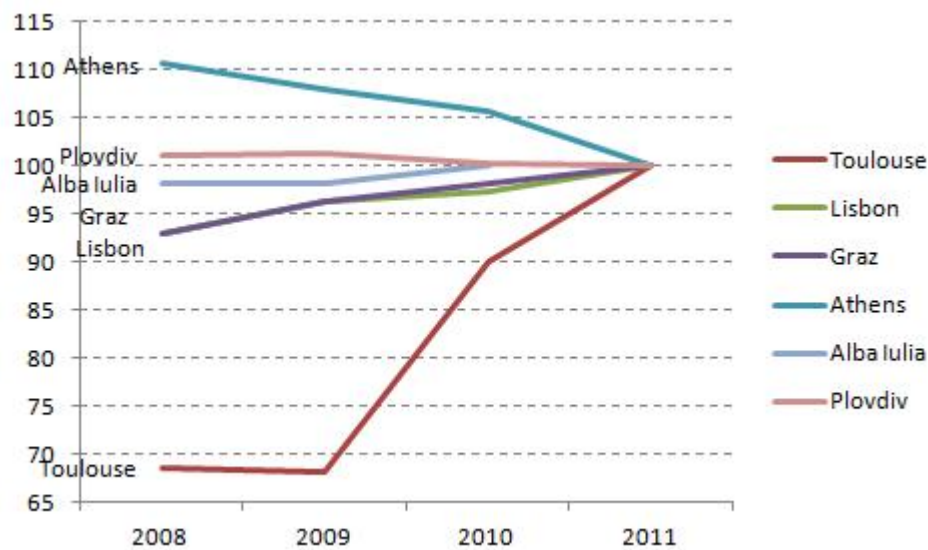


Figure 6 – Relative evolution of demand in sites (100 – baseline demand 2011)

The direction and magnitude of the trend in the recent years has been distinct in different places. Various different factors have been contributing for such trends. The extreme passenger increase in Toulouse is obviously associated with the inauguration of the new metro line. In some countries there has been a clear impact of the economic crisis with inverse forces acting: shift from cars to public transport on one side and less trips due to unemployment on the other side. In Eastern countries, particularly Plovdiv, the effect of growth and the related car ownership increase is likely to be the main explanatory factor for a reduced demand, following trends previously observed elsewhere in Europe. On the contrary, in other places like Graz or Toulouse factors like the “car peak” and the strengthening of urban mobility management measures may have had a strong influence in favour of public transport adoption. In Lisbon, Carris claims that the observed increase in demand should be partly a result of the intense quality improvements that have been undertaken in the past few years.

4.2 Relation between PT usage and quality

At this stage of the project there is few data on quality perceptions and public transport usage, since the sites have only recently started their observations. A critical discussion is provided on the ability to assess a relation at a later stage, when more data is available.

The ability of understanding the relation between quality perceptions and PT usage is limited in the short-term, since there is inertia between the change on delivered quality and the change of perceived quality among non-regular costumers. For example, if a quality improvement with the potential for a shift of 1% of car users to PT becomes known to 1% of the population of non-costumers, then the delivered effect is of only 0,01%. In the case of a relatively easy to communicate quality improvement, service frequency, the literature suggests a long run effect of about the double of the short run effect (see the

table below). This raises the importance of a good communication of quality improvements, which should have a particularly high potential in places where there have been recent large improvements in quality, as is the case of some of the ENERQI sites.

Furthermore the capability to quantitatively relate quality improvements with the attraction of new customers is generally difficult due to difficulties in empirical estimation, caused not only by the long term effect, but also by the simultaneous influence of many internal and external factors on demand.

Nonetheless there are empirical figures that can be used as reference. Paulley et al¹⁴ produced a revision of literature on the impacts of PT quality of service aspects. The following table summarizes a range of figures found mostly for bus services:

Table 9 – Impacts of changes in service quality aspects (bus services)

Quality aspect	Effect	Unit
Access time to boarding point and egress time from alighting point	1.4 to 2.0	units of in-vehicle time (IVT)
Service intervals	0.38 short run	elasticity of demand to vkm
	0.66 long run	
	1.6	units of in-vehicle time per wait time
Time spent on board of vehicle	-0.4 to -0.6	elasticity of demand to time
	-0.4 to -1.7	elasticity to generalised cost
The waiting environment	up to 6 pence	per trip
	up to 2 minutes	in-vehicle time
Vehicle or rolling stock characteristics	2.5% of IVT	replacing old for new rolling stock (rail)
	1.5% of IVT	per refurbishment
Public transport interchange	21 minutes	IVT (including walking and waiting times)
Reliability	additional time equal to standard dev. of trip time	unit of time
Information provision	2-20 pence (UK)	per trip

Some of these quality aspects relate directly to the operational quality criteria addressed in ENERQI. On the basis of these results it is possible to get rough estimates on the effects of related quality improvements. By considering a maximum range of quality improvements and converting them into an equivalent unit (in-vehicle time), it is possible

¹⁴ Paulley N, Balcombe R, Mackett R, Titheridge H, Preston J M, Wardman M R, Shires J D, White P (2006) "The demand for public transport: The effects of fares, quality of service, income and car ownership". Transport Policy, 13(4), pp.295-306.

to estimate a potential effect of those changes on demand. This exercise has been carried out for the purpose of achieving rough quantitative estimations of effects. The next table synthesises the outcome of this approach.

Table 10 – Potential effects of service quality improvements

Quality aspect	Related operational quality criteria	Potential improvement			Potential effect on demand (%)
		Maximum range of improvement (*)	IVT equivalent (minutes)	IVT equivalent (%)	
Time spent on board of vehicle	Time	-20% time	-4	-20%	10%
The waiting environment	Comfort Safety/security	-2 min (IVT equiv.)	-2	-10%	5%
Vehicle or rolling stock characteristics	Comfort Safety/security	-1 min (IVT equiv.)	-1	-5%	3%
Reliability	Time	-3 min standard deviation of time	-4	-20%	10%
Information provision	Information	-0,20€ equivalent	-1.5	-8%	4%
Total (sum)					31%

* - The *maximum range of improvement* should be understood as the quantitative change from a service at the bottom end of quality to a service at the higher end of quality.

If the potential effects on demand of the various quality improvements are considered together, they would convey an additional 31% demand to PT.

The five quality aspects considered roughly cover four of the five quality criteria relevant in ENERQI: Information, Time, Comfort and Safety/security. Customer service is not included. For the sake of simplicity, let us assume that considering customer service and other aspects related to the other quality criteria not included would enable a potential increase in demand of 40% in the long run from a lower end quality to a higher end quality.

This figure, if coupled with quantitative figures on perceived quality improvements, could be used to estimate the potential increase of demand resultant from those quality improvements. Obviously, such kind of quantitative estimation should be regarded as a very rough estimation, rather an indication of the order of magnitude of the expected effects than any kind of precise estimation. An example of such an exercise is presented in the following box.

Estimating effects of quality improvements at Carris

The operator Carris (Lisbon, Portugal) is yearly measuring customer satisfaction since 2005. Between 2005 and 2010, and following significant improvements in several quality aspects during those years, the customer satisfaction index has progressively increased from 54.2% to 67.7%.

Under the assumption that a maximum range of improvement of service quality would effect in a 40% demand increase, considering that the scale of measurement used accounts to 0% as the lower end quality level and 100% as the higher end quality level, and assuming that there has been no adjustment of expectations by the costumers, it can be estimated that the quality improvements made (+13.5%) produce an increase in demand of about 4.5%.

Looking at the actual trends in the demand of Carris, it indeed started to increase following the set of quality improvements undertaken. Although the sudden reversion in the trend of demand towards an increase in 2009 and 2010 may be related to the increase in fuel prices and the economic crisis during the same period, it is also plausible that it is also a result of the increase in quality and related communication campaigns of Carris.

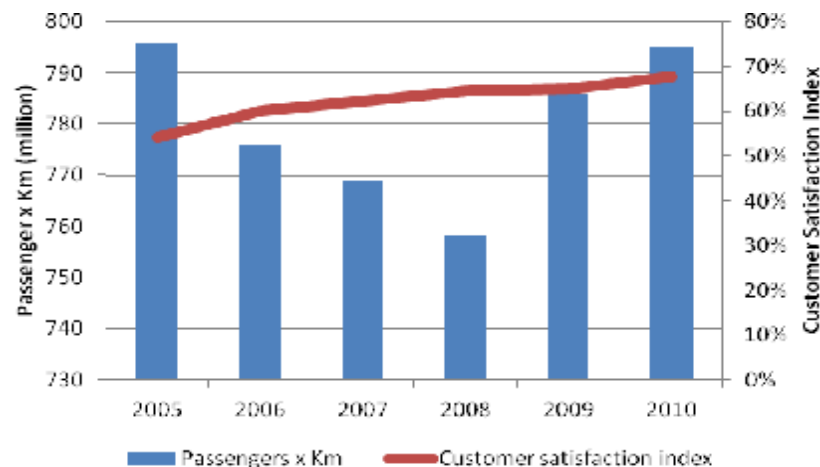


Figure 7 – Evolution of demand and satisfaction in Carris

4.3 Energy and Environment

The second Benchmark report will contain an assessment of the potential modal transfer caused by the evolution of quality perceptions in sites. The assessment will consider the estimated quantity of car kilometres not realised due to modal shift to public transport, and estimate energy and CO₂ savings on the basis of average specific energy consumption and emissions of public transport and cars. Some sites provided data on current specific consumption of their fleets that will serve as reference:

Table 11 – Average specific energy consumption per 100 vehicle-kilometres in some sites

	Diesel (l/100km)	CNG (kg/100km)
Lisbon, PT	56.40	47.31
Lancashire, UK	37.00	
Plovdiv, BG	35.00	35.00

5 PROCESS OF IMPLEMENTATION

5.1 Approach

The experience conducted in the ENERQI project allowed to collect lessons in terms of the process of implementation of the approach. At this stage of the project, the experience refers mainly to the set up process, while the exposure to the operation of the scheme is at its beginning.

For an evaluation of implementation issues, a simple approach was followed which consisted of asking the staff responsible for local implementation to raise the most relevant issues that were faced. Individual interviews were conducted. To let the interviewees remind and talk about relevant experience, the following three questions were raised:

Q1. What main barrier(s) did you find in setting up the ENERQI quality monitoring?

Q2. What could you have done better?

Q3. What have been the best thing(s)/decision(s) you have done in the setting up process?

The results of this enquiry are presented in section 5.2.

At a quantitative level, the success of the implementation can be partly characterized by the participation of volunteers. Both the number of observers and the rate of participation of recruited observers are important indicators. The results are presented in section 5.3.

5.2 Local expert analysis on local implementation

The main issues raised by local implementers of the ENERQI methodology are summarized in the table below.

Table 12 - Main topics raised by local staff regarding the process of implementation

Entity / Site	Barriers	What could have been done better?	Best actions made
DTV & operators Brabant, NL	- Observations cannot be formally used to give penalties to staff (e.g. drivers). Willingness of observers to keep cooperating through time.	No evaluation yet	- Giving feedback to volunteers.
TISSEO Toulouse, FR	- Difficulties with the use of the management tool	No evaluation yet	- Limiting the extent and alternating contents of the questionnaire to avoid wear of observers' motivation

Entity / Site	Barriers	What could have been done better?	Best actions made
CARRIS & TIS Lisboa, PT	<ul style="list-style-type: none"> - Confidentiality of data from observers has impeded full use of the common management tool. - Some observers are not comfortable with reporting through the internet 	<ul style="list-style-type: none"> - Making a clear linkage between the questions in the questionnaire and indicators. - Taking advantage of the positive image potentiated by publicly publicizing recruitment requests 	<ul style="list-style-type: none"> - Having the option of limiting the extent and alternating contents of the questionnaire to avoid wear of observers' motivation
HOLDING GRAZ & FGM Graz, AT	<ul style="list-style-type: none"> - Changes in the project team. - Higher than expected volume of resources needed to make compatible management systems for sites with different needs 	<ul style="list-style-type: none"> - Considering <i>a priori</i> the multiple needs of possible uses of the methodology 	<ul style="list-style-type: none"> - Sticking to available tools and knowledge facilitates implementation - Recruitment materials (press releases, posters and emails) seem to have been appropriate. - Giving feedback to volunteers
CRES & OASA Athens, GR	<ul style="list-style-type: none"> - Difficulty to recruit volunteers under a deep economic and social crisis - Mentality; people not willing to cooperate (but changing) 	<ul style="list-style-type: none"> - The recruitment approach could have been redesigned to achieve a more successful and faster gathering of observers. 	<ul style="list-style-type: none"> - Short term assignments (i.e. 2 months) and then new reminder for new assignment - High quality level of observers' service
LCC & operators Lancashire, UK	<ul style="list-style-type: none"> - Unexpected resource constraints - Institutional issues between operators and local authority 	<ul style="list-style-type: none"> - Choosing the right operators. 	<ul style="list-style-type: none"> - Common questionnaire appropriate to local context; keep it as simple as possible.
STP Alba Iulia, RO	<ul style="list-style-type: none"> - Mentality: lack of interest of people in working for their community - Consumers are not internet users 	<ul style="list-style-type: none"> - Refining approaches in the distribution of paper questionnaires, which is very resource consuming. 	<ul style="list-style-type: none"> - Involving students as assistants in the tasks.
EAP & Hebrus Bus Plovdiv, BG	<ul style="list-style-type: none"> - Mentality: people not used to the concept of contributing to the public good - Costumers not internet users 	<ul style="list-style-type: none"> - Communication: better explaining the benefits for the costumers 	<ul style="list-style-type: none"> - Recruitment: Approaching a main target group (older people) through clubs

One of the most important obstacles to overcome is the effective **recruitment of volunteers**. A successful recruitment is imperative for the development of a costumers observations' based quality monitoring. The ease with which observers were recruited differed across sites. These are apparently explained by **cultural** differences related to the predisposition of citizens to voluntarily cooperate for the common good. While in countries like Austria (Central European) there was a broad willingness of people to cooperate, other countries (particularly Eastern) like Bulgaria, Romania and even Greece, this predisposition is lower. Citizens in these countries are less familiarized and less confident with participating in such a scheme for the common interest. However, this

situation seems have a potential for change. If the advantages of the scheme are well explained (e.g. Alba Iulia), this improves citizens' willingness to participate. In Graz the quality of the recruitment materials and approach has been viewed as a key factor for the success of the recruitment. On the other hand, it became clear that younger people do have a different mentality compared to older people, as they are more inclined to participate (e.g. Athens). These two aspects point to positive prospects regarding the future ability of recruiting volunteers in areas where mentality is still less prone to it.

In some places there are important target customer groups which pose specific difficulties in the process of recruitment. Particularly for customers who are not **internet** users, the application of the methodology requires additional resources for communication and gathering of observations from the costumers. In places like Plovdiv, Alba Iulia or Lisbon the method of approaching observers for reporting had to be based on phone or person to person interviews, sometimes contrary to the initial plans. Plovdiv and Alba Iulia found creative ways of gathering observers under budget constraints, respectively by approaching them through clubs (clubs for senior people are common in Bulgaria) and by getting the cooperation of students in recruitment and gathering of observations. Additionally, in Lisbon it has been perceived that a public campaign to recruit observers (rather than the person to person or phone recruitment carried out) could have been more effective and furthermore has a positive side effect on the image of the operator towards its clients.

Several sites reported that the recruitment process could have been more effective if the strategy of recruitment had been planned in a different way, either in terms of format and means of **communication** with potential observers, or in the **organization** of the recruitment activities.

The ENERQI **management tool** was developed for use in different sites. That posed some difficulties in the development of a tool that fitted the needs of different users. For various reasons (including the existing functionalities of the tool, confidentiality issues, or the inability of target customer groups to use the internet), some sites reported difficulties in applying the common tool for their purposes, and eventually found alternative ways to carry out some of the functionalities of the tool. The tool has been fine tuned to meet some of the needs that were raised. It still has scope for further improvements with the aim of becoming a flexible and widely used tool. Considering the exact needs of each user of such a tool is therefore important to guarantee that it will correctly address them in the tool design. The particular case of confidentiality issues can be a barrier to the use of a common tool as was done in ENERQI, since confidential information could not be shared in a database that could be accessed by various parties.

Rather **external factors** like changes in staff, institutional issues with operators, or even the economic crisis have been reported as important barriers in some sites.

In the Netherlands, where customer based quality monitoring has already accumulated experience, barriers related to later stages of the operational process were reported. Regarding the integration of the monitoring with management instruments, unlike initially

planned it was not possible to give penalties to staff, since it is not formally possible. On the other hand, reporting results to staff (particularly drivers) can be a simple way of making the workers notice that their work is appreciated and is an effective instrument to increase **staff motivation**.

Another issue in the Netherlands was the fact that there was a **decreasing willingness of observers to cooperate** through time. Following concerns that the length of the common ENERQI questionnaire would negatively affect the willingness of observers to cooperate, some partners took the initiative to split the questionnaire in two parts and deliver them alternatively in consecutive months. It was expected that such a reduction in questionnaire size would reduce the chances of losing observers motivation. Therefore, a general effort to keep the questionnaire simple enough was perceived by operators as a key factor for success.

A definition of the linkage between **quality indicators** and the questions present in the common questionnaire was not done in detail prior to the beginning of the operation. Although the questionnaire was carefully prepared to consider the most important quality aspects of public transport, a prior check of its exact relation with final analytical indicators is appropriate to assure that such linkages can be established and that the desired ultimate indicators are appropriately covered.

5.3 Participation of observers

The following table shows the number of observers recruited and the rate of participation of those observers during the ENERQI observations. Participation of an observer is understood as participation within at least one observation.

Table 13 – Quantity and rate of participation of volunteers

	Observers recruited	Participating observers	Rate of participation
Noord Brabant, NL	600	153	25%
Toulouse, FR	450	356	79%
Lisbon, Portugal	500	497	99%
Graz, AT	336	160	48%
Athens, GR	102	59	58%
Lancashire, UK	65	32	49%
Alba Iulia, RO	328	201	61%
Plovdiv, BG	160	128	80%

There are very distinct rates of participation across sites. There are obvious explanations for some differences. The two extreme cases are the most notable.

In Noord Brabant presently only a fourth of the observers ever recruited are participating. This can be explained by the fact that observer based quality monitoring is ongoing in the site for a long period before ENERQI started. Since then, many of the initial observers have stopped cooperating. This fact may be evidence that observers tend to lose

motivation with time for cooperating, or do to changed habits do not qualify for cooperating. Also the changed reward system contributes to the lower active participation. The quality monitoring management team in Noord Brabant is presently planning a new round of observer recruitment.

In Lisbon the participation rate has been almost 100%. This can be explained by the fact that the first trials of observations in Lisbon have been collected via telephone interviews. It thus seems that, having previously agreed to cooperate, observers will nearly always do so when specifically called on the phone for that aim. This approach not only guarantees a high participation but also allows for a consistent sample covering all targeted customer segments, but has the drawback of being more resource consuming.

6 CONCLUDING REMARKS

The 1st Benchmark Report describes the results of the first quality observations in all ENERQI sites and interprets those findings on the basis of comparisons of the results between sites.

Regarding the interpretation of quality monitoring results, the data clearly confirms that quality monitoring cannot describe absolute delivered quality. In fact, sites apparently with higher delivered public transport quality do not have the higher results on perceived quality. This apparent paradox cannot be explained by cultural differences. With support on the literature on personal satisfaction, it can be concluded that the main factor is adjustment of expectations. For instance, in a site where the quality expectations are high, ratings will be lower than in another site with similar delivered quality but with lower expectations from the costumers. Expectations adjust with time, with delivered quality and other factors. The conclusion for a sound interpretation of results is that the (adjustment of) expectations must always be taken into account in the interpretation of perceived quality results.

The measurement of the effects of the ENERQI approach on the ultimate objectives of the project – modal shift towards public transport, energy savings and reduction environmental costs – cannot be made with precision and a pragmatic approach is necessary to provide estimations. This report proposed an approach based on what empirical results there are available in the literature regarding effects of specific quality improvements. An aggregate accounting of empirically measured effects of several types of actions will provide an indicative parameterization for estimation of the effects of evolution of perceived quality on public transport use.

Even if to date the results do not allow relating the evolution of perceived quality with quality improvements, it was possible to identify plausible connections between past quality changes and the results obtained in the ENERQI monitoring. In line with the assumption that expectations strongly affect perceived quality, it can be expected that in each point in time positive or negative perceived quality results relate to quality changes, because quality changes introduce a divergence between acquired expectations and delivered quality. The relation of positive or negative results with recent quality changes has been apparent both in the ratings given to each specific indicator and in the costumers' opinion on which are the most important quality aspects. Two examples are the relation of positive ratings on driver behaviour with recent driver training in Graz and the relation between high negative appraisal on price in Lisbon and the recent high price increases in the site.

The opinion of local staff in the implementation of the ENERQI approach is valuable in identifying relevant lessons for future experiences. In the interviews conducted, they were called to raise the issues that were most importantly perceived as barriers, lessons or factors of success in the local experiences. There was significant diversity on the issues

raised in different sites. The issues highlighted in this report regarding the set up process were the effects of cultural and technological differences regarding the ability to recruit observers and have them use the web tool, the strategy of recruitment, the importance of having methodological aspects set up from the beginning, and the need for adaption of the web tool to distinct local needs. In the Netherlands, where there is a longer experience with the operation customer based quality monitoring, coping with decreasing willingness of observers to cooperate and being able to find mechanisms to motivate staff through the monitoring results were the most relevant issues of concern to them regarding operation.

The rate of participation of recruited observers has had significantly different results in sites. This is directly explained by the approaches followed in recruitment and observation reporting methods. Sites which rely exclusively on reporting via the web tool the rate of participation is lower than in sites where direct contact with the observers is made. The last option nonetheless comes at a cost of additional resources from carrying out the monitoring. At the time of this report, the number of recruited observers and obtained observations generally did not level with the targets established in the beginning of the project, calling for additional efforts to recruit new observers and motivate the existing ones. This second round of recruitment will likely be undertaken in a more cost-effective way, following lessons learned in each site.

The results obtained in this report will be completed by the 2nd Benchmark Report, after a more complete set of observations and quality improvements have been carried out. On the basis of these results, it will provide an estimation of public transport use and energy and emission savings following the evolution of perceived quality.