The Cycle Balance: benchmarking local cycling conditions

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1 Introduction

The Netherlands is a country that is well known for it's cycling. Over 80 % of the people own at least one bicycle. And with no mountains to speak of, a moderate climate and the fact that the Dutch live in close proximity to one another, people use their bicycles from very young to very old, all year round and for all purposes. In fact cycling is a normal day by day mode of transport for most Dutch people: about 34 % of all the trips less than 7,5 kilometres are made by bicycle, while the car provides for 38 %, walking 23% and public transport only 3% (Ministry of Transport, Public Works and Water Management, 2001).

The Dutch Cyclists' Union (Fietsersbond) asserts the interests of cyclists in the Netherlands and is dedicated to achieve more and better conditions for cycling. It strives to make the bicycle more competitive with other modes of transport over short distances. In terms of time, as well as in terms of safety and comfort. For this an infrastructure should be provided that gives cyclists the most direct, attractive, comfortable and safe route possible within a coherent cycling network.

As a result of the high bicycle-use, Dutch government, private organisations and companies invest a lot of time and money in support of cycling. There are for example over 20 000 km of bicycle lane and bicycle path along Dutch roads and the capacity of bicycle parking facilities at railway stations alone is almost 300 000. Strangely enough the effectiveness and efficiency of all these efforts have never been assessed. In order to fill this void the Fietsersbond developed the Cycle Balance (Fietsbalans). This benchmarking project is funded by the Ministry of Transport, Public Works and Water Management. Impartial assessment of local cycling conditions is used as strategy to improve local cycling policies. This chapter wishes to discuss the background, contents, results and effects of this project.

2 History, objectives and characteristics

The idea for the Cycle Balance originates from the need that was felt by the Minister of Transport and the Fietsersbond to maintain attention on cycling that was generated by the *Bicycle Master Plan* (Ministry of Transport, Public Works and Water Management, 1991) during the first half of the 1990s and make results manifest on the streets. At the same time the Minister recognised the need for strong interest group for cyclists to enhance their position in local policy and practice. Thus arose the idea of a benchmarking project on local cycling conditions: the Cycle Balance, executed by a specially formed team at the Fietsersbond central office and funded by the Ministry of Transport, Public Works and Water Management. The project that started in the summer of 1999 has two main objectives:

- The primary objective of the project is to stimulate local authorities to adopt a (still) better cycling policy using benchmarking techniques. The aim of benchmarking is to learn from others by comparing the performance of one town to that of others and look for best practices.
- The secondary objective of the project is to enhance the position and strength of the local Fietsersbond branches. As most decisions that influence cycling conditions are made on a local level, it is important that the Fietsersbond local branches are recognised by local councils and civil servants as knowledgeable and influential partners that represent the interests of cyclists. Therefore the Cycle Balance is used to establish a cooperative environment in which discussion is based on facts rather than emotions.

The perspective within the project is that of the cyclist. This guides both the collection and the assessment of data. That's why *Sign up for the bike* (CROW, 1993) is used as the primary basis for the choice of assessment criteria, the collection of data and the units of measurement and standards. This design manual for cycle friendly infrastructure proves that taking the characteristics of both the bicycle and the cyclist seriously is the basic condition for good cycling policy.

The initiative for benchmarking as a method to better one's performance is usually taken by the company or organisation itself. In the Cycle Balance the benchmarking initiative is taken by an outsider. Consequentially the internal incentive to generate and implement the results is absent. The Fietsersbond has to convince local authorities that participating in the project is in their interest. They have to be 'seduced' to implement improvements. That is why the Cycle Balance is designed as a project on which the local branches of the Fietsersbond, the Fietsersbond central office and the councils of the participating towns work together to generate reliable information that is meaningful in the decision-making process.

The Fietsersbond local braches are very much involved in the project, both in data-collection and in communicating and discussing the results. This means that the Cycle Balance profits from the local knowledge and involvement of hundreds of volunteers in the towns that participate in the project. By 2002 the project has been executed in 115 towns which include all Dutch towns with over 100 000 inhabitants and cover almost 50 % of all Dutch cyclists (see Fig. 1).

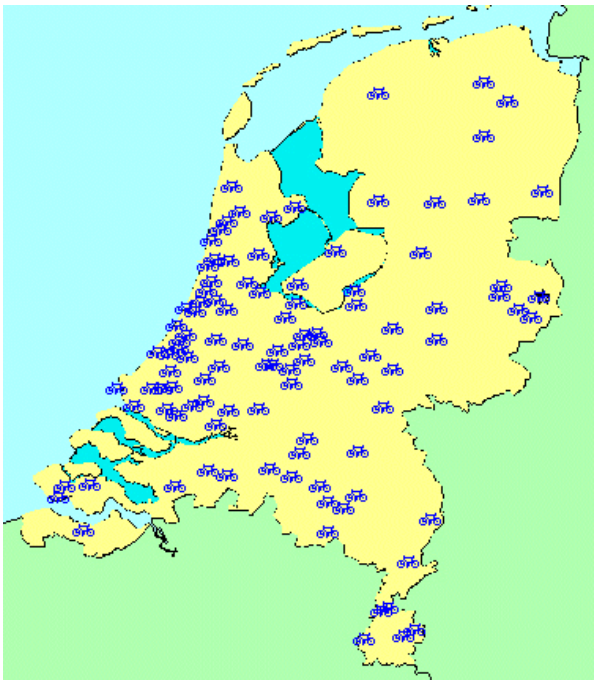


Figure 1 Distribution of the participating towns throughout the country

3 The four surveys of the Cycle Balance

The Cycle Balance assesses ten different dimensions (and 24 sub-dimensions) of the local conditions for cyclists (see Table 1). These dimensions provide a good mixture of policy results, policy effects and policy process.

1. Directness	6. Bicycle use
2. Comfort (obstruction)	7. Road safety of cyclists
3. Comfort (road surface)	8. Urban density
4. Attractiveness	9. Cyclists satisfaction
5. Competitiveness compared to the car	10. Cycling policy on paper

Table 1 The ten dimensions of assessment in the Cycle Balance

The original idea when designing the project was to use existing data as much as possible. These data had to be relevant, comparable, reliable and generate information on a local level. Very few existing databases met these conditions. More then anticipated, the team had to collect the relevant data themselves. The research part of the project contains of four surveys.

A questionnaire for the municipality, filled out by the towns' civil servants, is used to assess the local authorities' cycling policy on paper. Although policy papers by them selves do not improve cycling conditions, a good cycling policy is vital for long term comprehensive decision making and practice. A good cycling policy focuses on the cyclist and therefore meets with certain quality requirements. The following themes are

addressed: policy papers and plans, the bicycle network, bicycle parking, budgets and the council as employer.

A questionnaire on cyclists satisfaction is used to assess if the cycling conditions meet with the requirements of the day-to-day cyclists. After all, the cyclists are the customers! Stimulating bicycle-use is more likely to be successful if it meets their needs, desires and requirements. The questionnaire consists of simple questions on bicycle parking, cycling comfort, road safety for cyclists, social safety, the handling of bicycle theft and the municipality's cycling ambitions.

On some dimensions of local cycling conditions data are available in national databases of organisations like Statistics Netherlands (CBS) and the Institute for Road Safety Research (SWOV). Using these data the dimensions bicycle-use, road safety for cyclists and urban density are assessed.

The Quick Scan Indicator for Cycling Infrastructure is used to assess the quality of the local cycling infrastructure. This is the most innovative and appealing of the four surveys. The Fietsersbond developed this method in alliance with several specialised engineering companies. With a specially designed measuring bike 12 to 16 routes criss-cross through the city are investigated. This measuring bike as shown in Figure 2 registers on a laptop computer time, distance, speed, sound and vibrations (and thus indirectly also stops, waiting time et cetera). A video camera records at the same time the road profile, type of road surface, manoeuvres and obstacles. These data are linked by a special computer program so that for example 'the average vibration disturbance of cycle-tracks with asphalt paving' and 'the average waiting time at intersections with traffic lights' can be determined. Using these data the dimensions directness, comfort (obstruction), comfort (road surface) and attractiveness are assessed.

Figure 2 The measuring bike of the Fietsersbond

Special attention has been given to the choice of routes because the assessment results in the various towns have to be comparable. According to a fixed method of random sampling 12 to 16 routes are selected in and around the city centre. These routes go from a randomly chosen house to a destination that attracts many cyclists and subsequently to an other house etc, thus giving a representative picture of how cyclists move around in the town. While the measuring bike rides the 30 to 40 kilometres of selected routes, at the same time a car drives the same routes as the bicycles to determine the competitiveness of the bicycle, both in time and in cost.

4 The assessment of participating towns

For each of the participating towns a comprehensive report is made on the results of the assessment, giving an adequate, objective and comprehensive picture of the local cycling conditions. It contains a reliable assessment of the local cycling conditions on 10 dimensions (and 24 sub-dimensions). The results are compared with:

- existing and developed standards;
- average scores of all 100 towns and towns of roughly the same size;
- the best scoring towns.

This way the towns gain clear understanding of the strong and weak aspects of their cycling policy and are able to compare their efforts and results with those of other (comparable) towns. They can reliably determine which aspects most urgently need improvement. Table 2 shows the assessed (sub)dimensions, the indicators that are used, the standards and intervals that are used and the average assessment results.

The table shows that small towns score well on attractiveness and directness. The chosen indicator to assess attractiveness is noise pollution. Noise is relatively easy to measure and not many cyclists find noisy surroundings attractive. In fact the results showed a correlation between the scores on

Table 2 Geneal overview of the Cycle Balance assessment results

Assessed (sub)dimension	Standard	Interval	Overall Average	Average big towns*	Average medium size towns**	Average small towns***
Directness						
Detour factor (ratio)	1,25	0,1	mediocre	mediocre	very good	mediocre
Delay (sec/km)	16,5	10	good	mediocre	good	very good
Actual cycling speed (km/h)	15,5	1	mediocre	mediocre	mediocre	good
Overall judgement directness			**mediocre**	**mediocre**	**mediocre**	**mediocre**
Comfort (obstruction)						
Chance of stopping (N/km)	0,75	0,5	mediocre	bad	mediocre	good
Slow cycling and walking (% of time)	7,5	5	mediocre	mediocre	mediocre	mediocre
Traffic-obstruction (v-Fv)	1,75	1,5	mediocre	mediocre	mediocre	mediocre
Infrastructural impediment (v-Fi)	0,75	0,5	mediocre	mediocre	mediocre	bad
No right of way (N/km)	2,5	1	mediocre	mediocre	mediocre	bad
Turning off(N/km)	2	0,5	mediocre	mediocre	mediocre	bad
Overall judgement comfort (obstruction)			**mediocre**	**bad**	**mediocre**	**mediocre**
Comfort (road surface)						
Hindrance caused by vibrations (v-Ft)	100	40	**mediocre**	**mediocre**	**mediocre**	**bad**
Attractiveness						
Noise pollution (v-Fg)	130	40	**mediocre**	**bad**	**mediocre**	**good**
Competitiveness						
Journey time ratio (ratio)	1	0,1	good	good	mediocre	mediocre
Journey bikes faster (% of journeys)	70	20	mediocre	mediocre	bad	mediocre
Costs per journey (cents)	100	30	bad	good	bad	very bad
Overall judgement Competitiveness			**mediocre**	**good**	**mediocre**	**bad**
Bicycle use						
Share in trips to 7.5 km (%)	43	4	**mediocre**	**mediocre**	**bad**	**mediocre**
Road safety of cyclists						
Victims per 100 million cycle km (N)	14	4	**mediocre**	**mediocre**	**bad**	**mediocre**
Urban density						
Adresses per square kilometre (N)			**mediocre**	**good**	**good**	**mediocre**
Cyclists satisfaction						
Bicycle parking (% dissatisfied)	17,5	15	mediocre	mediocre	mediocre	bad
Comfort (% dissatisfied)	17,5	15	mediocre	mediocre	mediocre	mediocre
Road safety for cyclists (% dissatisfied)	17,5	15	mediocre	mediocre	mediocre	mediocre
Social safety (% dissatisfied)	17,5	15	good	good	good	good
Approach to bicycle theft (% dissatisfied)	17,5	15	very bad	very bad	very bad	very bad
Municipality's cycling ambitions (% dissatisfied)	17,5	15	good	good	good	good
Report mark	7,25	0,5	mediocre	mediocre	mediocre	mediocre
Overall judgement cyclists satisfaction			**mediocre**	**mediocre**	**mediocre**	**mediocre**
Cycling policy on paper						
Policy papers and plans (N)	16	4	mediocre	mediocre	mediocre	bad
Bicycle network (N)	13,5	4	mediocre	mediocre	mediocre	mediocre
Bicycle parking (N)	14	3	bad	mediocre	mediocre	bad
Budgets (N)	4	1	bad	mediocre	bad	bad
Council as employer (N)	5	1	mediocre	mediocre	good	mediocre
Overall judgement cycling policy on paper			**mediocre**	**mediocre**	**mediocre**	**bad**

* big towns = more then 100.000 inhabitants

** medium size towns = 50.000 - 100.000 inhabitants

*** small towns = 20.000 - 50.000 inhabitants

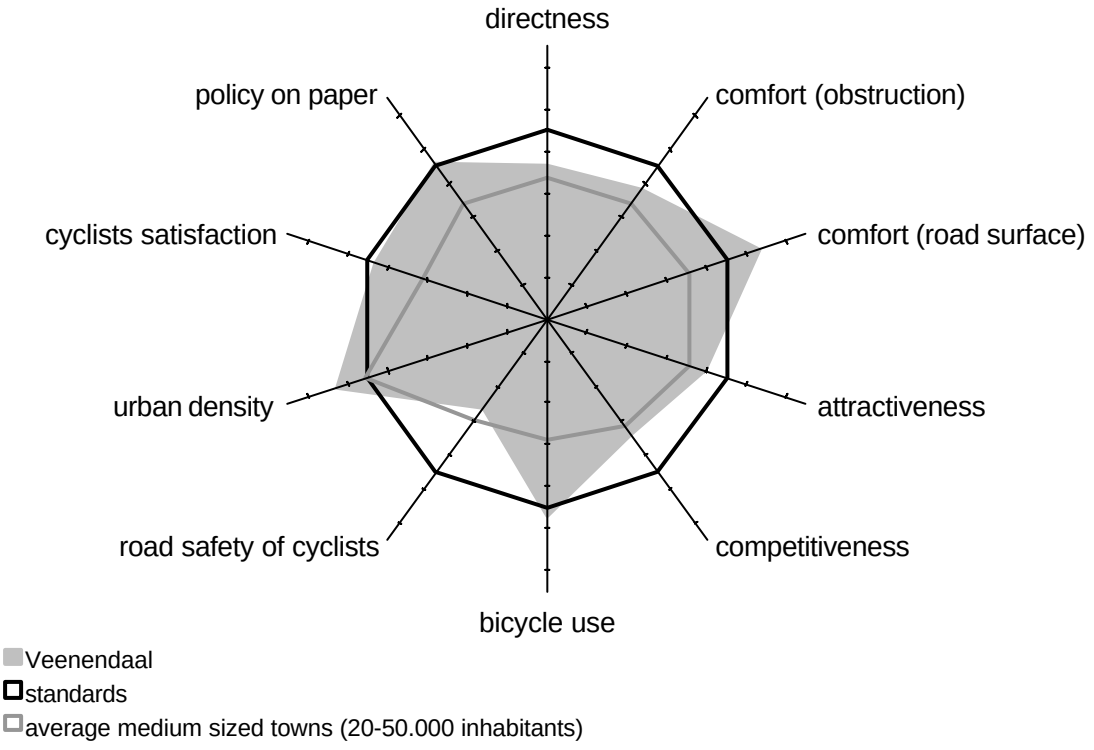
attractiveness and cyclists' satisfaction. The explanation for the good score of small towns is fairly obvious: noise is predominantly produced by motorised traffic of which there is less in small towns whereas in big towns cyclists are often on bicycle paths or lanes next to busy motorised traffic. The fact that small towns do well on directness is due to good average speed en very little delay. Cyclists in big towns suffer more than twice as much delay as those in small towns. The sheer number of traffic lights is the culprit causing over 80% of the delay in big towns.

While cyclists in small towns enjoy attractive and direct routes, big towns excel in the competitiveness of the bicycle compared to the car. Basically you are a thief of your own time and money not to use the bicycle for short trips in the big towns. On average in big towns the bicycle is 5% quicker than the car. The costs car parking are substantial, averaging 40 eurocents per hour for every trip, some five times higher as in small towns.

The reports on the assessment results of each individual town discuss in great detail the relevance of each (sub) dimension, which data were collected, how standards were determined and the assessment method. The main part of the report consists of a presentation of the assessment results and the conclusions that can be drawn on the basis of these results. Finally recommendations are given on how to improve the towns' performance on the (sub) dimension.

To illustrate the results of the assessment a brief account is given of the results, conclusions and recommendations based on the central graph of Veenendaal as presented in Figure 3. The graph shows clearly the strong point of Veenendaal. It is a very compact town with many destinations within cycling distance. Bicycle-use is high and cyclists are satisfied with the quality of cycling conditions offered to them. The road surface is of extremely high quality, mainly because of the use of asphalt on bicycle paths with smooth joints on intersections and good maintenance. Finally the policy on paper meets with the standards set in *Sign up for the bike*. The cycling policy is complemented by free guarded bicycle parking in the city centre and at the railway station.

Figure 3 The Cycle Balance score of Veenendaal

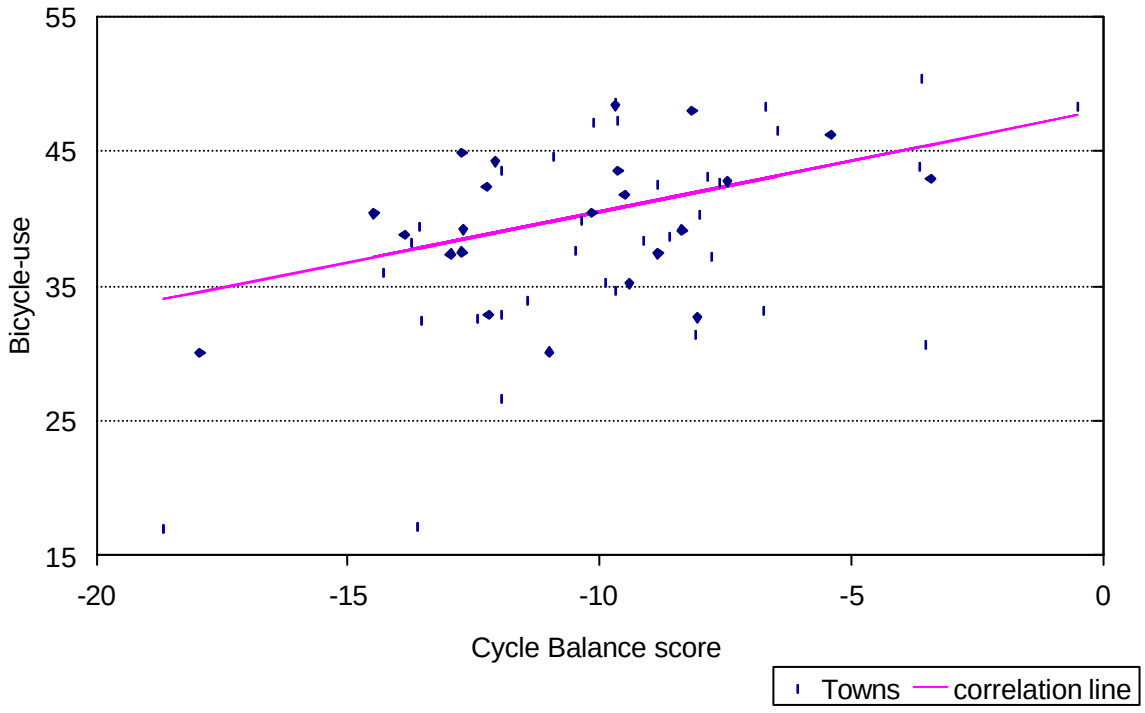


However Veenendaal also has its weaker points and these show very clearly in the graph as well. Most striking is the relatively high risk of cyclists getting involved in a serious accident. It is likely that intersections with busy 50 km/h roads are the main cause of the problem. The solution should be to reduce car speeds at these intersections, and building roundabouts has proved to be a successful strategy to achieve this. The relatively low score on directness is caused by a high detour factor, probably caused by the limited passages under or over the railway tracks. A good analysis of the problem, using a matrix of origins and destinations (the O/D matrix), should be made to see if easy solutions can be found in the way of short cuts for bicycles. The obstructions caused by road design and fellow road users make cycling sometimes uncomfortable. Obstruction by cars on roads where cars and bicycles are mixed and the fact that cyclists have to make many turns to reach their destination also explain the relatively low average speed. A traffic policy which bans motorised through traffic from residential roads is the way to enhance cycling conditions on this aspect. Finally the competitiveness of the bicycle compared to the car could be better. In half of the trips that are part of the assessment the car was quicker than the bicycle. Most importantly the parking costs for the car are too low to act as an incentive for people to take the bicycle on short trips instead of the car. Giving cyclists more direct routes, preventing cars from going through the city centre and raising parking costs for cars at important destinations like the city centre, the railway station and office areas is the effective strategy for the bicycle to compete better.

5 Good cycling policy works

The surveys in the 115 towns produced unique databases on the cycling conditions in The Netherlands. Never before has so much data on cycling been collected in such a systematic way. Apart from the reports on each individual town, analyses have been made on a general level. The most important result of these analyses is that a strong correlation can be found between the actual bicycle-use and the scores on the nine other dimensions of the local cycling conditions that are assessed in the Cycle Balance. Figure 4 shows that in towns with a high score on the Cycle Balance bicycle-use is 30 % higher than in low scoring towns. This means that the assessment in the Cycle Balance is relevant. But more importantly it shows that a well executed coherent cycling policy pays off in terms of more cyclists and more cycling.

Figure 4 Correlation between bicycle-use and score on the Cycle Balance



However, although the correlation between score on the Cycle Balance and bicycle-use is strong, it only explains 20 % of the difference in bicycle-use in the assessed towns. Because of that we looked for other factors that play a part in the difference in bicycle-use in between towns. First of all we looked at the influence of the use of public transport on short trips. Although the share of public transport in short trips is at most 11 % (in Amsterdam and Rotterdam), 75 % of these trips are at the expense of bicycle trips. If the use of public transport is incorporated in the model, it explains over 40 % of the variance in between towns. Competitiveness of the bicycle compared to the car then becomes the strongest explanatory factor; three times more then the other dimensions in the Cycle Balance. Characteristics of the population were also examined. Unsurprisingly age is an important factor: older people cycle less and teenagers cycle more. The strongest correlation however was found with the percentage of protestants in a town. Although cycling is not religious, Calvinists are known for strong principles and sober lifestyles. These characteristics not only influence the choice of mode of transportation, it also influences the local political decision making on transport and traffic in favour of the cyclist as it leads to higher bicycle-use and a better score on the Cycle Balance.

After incorporating these significant characteristics in the model, the theoretical potential growth of bicycle-use in the Netherlands is at least 12 %, if cycling conditions in all towns would meet with the set standards. Good cycling conditions lead to more cycling and towns with many cyclists have a better cycling policy, which in turn leads to better cycling conditions. This is a self enhancing process. Small towns can make easy progress by enhancing the competitiveness of the bicycle compared to the car. Big towns have to make efforts to make cycling more enjoyable: better flow, less disturbance by motorised traffic and less noise.

6 Local debate and effects

For every assessed town a comprehensive report is written. The assessment results should provoke a debate on the necessity and actions to improve cycling conditions and policy. In order to be effective, this debate should take place in the public arena: the city council and the local media. The strategy of the Dutch Cyclists Union is to have the report put on the agenda of the council committee for transport and traffic, accompanied by a list of priorities for actions and activities the council should decide on to improve cycling conditions. The local and regional media are informed through a press release and invited to a presentation to the council. This has proven a successful strategy. In most towns council committees have given the Fietsersbond the floor for 20 to 30 minutes. During the presentation the councillors are confronted with the prediction for the potential growth of bicycle-use if the right actions are taken. This often leads to a lively debate on what actions should be given priority within the given limitations of the budget. However in many cases the committee and the alderman for traffic and transport agree that a (new) comprehensive local cycling policy plan should be developed and budget reservations should be made to execute these actions.

The success of the Cycle Balance is mainly due to the enormous efforts of the volunteers of the local branches of the Fietsersbond. Over three hundred volunteers worked thousands of hours on preparing, executing and computing the surveys. An evaluation shows that these volunteers are very content with the project and they feel it will definitely help them in their lobby for better cycling conditions in their towns. Local and regional publicity in combination with the contact with local civil servants and politicians have given them an (even) better position and status as a local interest group. Their image has become more professional and that gives their opinions more importance in the decision making process.

The visible improvements on the streets as a result of the Cycle Balance are still scarce but a lot has been set in motion and many participating towns have indicated that cycling is getting more priority in terms of time and money so that many visible and measurable improvements can be expected in a few years time. The Fietsersbond, the local branches and the team at the national headquarters, will keep a close watch on the local developments to make sure cyclists benefit in terms of more safety, more comfort, better flow, etc.

7 Publicity and the ‘Cycle-city’ elections

Media attention has been recognised as an essential aspect of the project from the beginning and has been incorporated in the design of the project. Influencing public opinion in all stages of the project is conditional to its status and thereby its effectiveness. The Quick Scan measurements have successfully been used to generate local, regional and even national publicity. The extensive media coverage is mainly due to the high tech measuring bicycle’s appeal to the camera, but the presentations of the assessment results and subsequent discussions in council committee meetings also get good coverage in local and regional newspapers.

To make the project even more exciting, a competition element was introduced. In November 2000, based on the analysis of all collected data, five towns of different sizes were nominated for the ‘Cycle-city 2000’ title. An independent jury declared the town of Veenendaal the winner. The jury praised Veenendaal for it’s overall coherent policy and for the high quality of the infrastructure and other facilities for cyclists. But especially the fact that Veenendaal was not known for it’s excellence clinched it for Veenendaal. In December 2002 a jury chose the town of Groningen as Cycle-city 2002 (Fietsstad 2002, see Fig. 5) from six nominated towns. The main consideration of the jury was that the excellent competitiveness of the bicycle did not only lead to a very high modal share for the bicycle (47%) but also to a low modal share for the car (23%) in inner city transport. The publicity and interest these Cycle-city elections have generated has been used to communicate the good practices that can be found in the nominated towns. The main focus of communication has been on traffic and transport professionals, civil servants and local politicians of other towns so they cal learn from these excellent achievements.

Figure 5 The Cycle City 2002 prize is an official road sign for entering a build-up area.

The special focus on publicity in the project has paid off. The project is a household name for everyone involved in bicycle planning. It is known to the relevant target groups: civil servants, aldermen, council members, (other) professionals. Participating towns are eager to get the final results and new towns still show interest to participate. Several of these have already indicated that they want to use the results to revise their cycling policy. The bicycle in general and the Cyclists Union in particular have also benefited from all the media attention.

8 To be continued

In 2003 new towns will be assessed with the Cycle Balance method. However, large numbers of new participating towns are not to be expected. Several of the assessed towns have already shown interest in the return of the Cycle Balance to see if their cycling policy results in actual improvements that can be measured in the streets. This will however not be worthwhile before 2005. This means that the emphasis will shift to other aspects of the benchmark.

Two best practice studies will be conducted. The first one will be on bicycle friendly Traffic-light Regulation Installations (TRI). These are responsible for 85% of the total delay in bigger towns and a big irritation for most cyclists because they always seem to come last. Good examples of TRI’s which increase the chance of proceeding and minimize waiting time will be promoted to local authorities and the suppliers of TRI’s. The second best practice study will be on road surface for cyclists: paving. Cyclists specially appreciate a good road surface because bicycles hardly have any suspension. Bicycle tracks however are often flag-paved and

many important bicycle routes on roads for mixed traffic have clay pavers. These often have poor quality. The study will show the effect of different quality of paving for different materials but also for different modes of construction and maintenance. Again good examples will be promoted to local authorities and construction companies.

The Cycle Balance assesses the cycling conditions on a general (network) level. Both local branches of the Fietsersbond and various highways authorities have shown interest to use the measuring bike for the assessment of a specific bicycle route. This means slightly adjusting the existing method so that assessment of individual road-sections and intersections can be made. The assessment will identify actual problems and give advisable solutions. For the presentation of the results desktop mapping will be used.

Finally there has been international interest in the use of the Cycle Balance method, in particular the measuring bike, mainly from Germany and Belgium. The Fietsersbond will seriously look for ways to make this possible. Problems with regard to organising the process, language and funding have to be solved.

References

1. Centre for Research and Contract Standardization in Civil And Traffic Engineering CROW, *Sign up for the bike: design manual for a cycle friendly infrastructure*, Ede, 1993.
2. Ministry of Transport, Public Works and Water Management, *Bicycles first: the Bicycle Master Plan,* The Hague*,* 1991.
3. Ministry of Transport, Public Works and Water Management, *Facts about Cycling in the Netherlands*, The Hague, 2001.