

**CiViTAS**  
Cleaner and better transport in cities

**ARCHIMEDES**

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## Monza

### R62.1 – Planning of cycling strategy study in Monza

City of Monza

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# 1 Introduction

## 1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for City-VITALity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

**CIVITAS I** started in early 2002 (within the 5th Framework Research Programme);  
**CIVITAS II** started in early 2005 (within the 6th Framework Research Programme) and  
**CIVITAS PLUS** started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

### Objectives:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

### Horizontal projects support the CIVITAS demonstration projects & cities by :

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

### Key elements of CIVITAS

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement

- Cities are living 'Laboratories' for learning and evaluating

## 1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

## 1.3 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

### 1.3.1 Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:

- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the public transport company features as a partner in the proposed project.

## 2 Monza

Monza is a city on the river Lambro, a tributary of the Po, in the Lombardy region of Italy, some 15km north-northeast of Milan. It is the third-largest city of Lombardy and the most important economic, industrial and administrative centre of the Brianza area, supporting a textile industry and a publishing trade. It is best known for its Grand Prix.

The City of Monza, with approximately 121,000 inhabitants, is located 15 km north of Milan, which is the centre of the Lombardia area. This area is one of the engines of the Italian economy; the number of companies is 58,500, i.e. a company for every 13 inhabitants.

Monza is affected by a huge amount of traffic that crosses the city to reach Milan and the highways nodes located between Monza and Milan. It is also an important node in the Railways network, crossed by routes connecting Milan with Como and Switzerland, Lecco and Sondrio, Bergamo and Brianza. "Regione Lombardia", which in the new devolution framework started in 1998, has full responsibility for establishing the Local Public Transportation System (trains, coaches and buses) and has created a new approach for urban rail routes using an approach similar to the German S-Line or Paris RER.

Monza has recently become the head of the new "Monza and Brianza" province, with approximately 750,000 inhabitants, and has gained the full range of administration functions since 2009. Plan-making responsibilities and an influence over peri-urban areas will require the city to develop new competencies.

In this context, the objective of the City of Monza in participating in CIVITAS as a Learning City is to set up an Urban Mobility System where the impact of private traffic can be reduced, creating new means of mobility on offer, where alternative modes become increasingly significant, leading to improvements to the urban environment and a reduction in energy consumption (and concurrent pollution).

## 3 Background to the Deliverable

Over the last five years Monza has invested in creating an important infrastructure for cyclists. This network is not yet fully interconnected, but the number of cyclists has been increasing for some time.

The implementation of this measure will allow a significant boost to develop soft mobility (also known as smarter choice) measures in the area, continuing to promote bicycle use as a cost effective way to reach important Mobility nodes. In addition, cycling offers advantages of both improved health and as well as greater energy-efficiency Cycling is an ideal mode of transport for medium-sized areas, such as Monza.

The measure covers two tasks:

### **RTD Task 11.6.5: Planning of cycling strategy**

Monza has undertaken a study to identify suitable measures to implement cycling mobility.

### **DEMO Task 6.2: Cycle Transport Improvements**

The city of Monza will implement improvements to cycle facilities based on the findings of the present study.

## **3.1 Summary Description of the Task**

This deliverable relates to the research task 11.6.5 and details the findings and suggests how they will be implemented in order to bring about improvements to cycle facilities in Monza

### **3.1.1 Aims of the Study**

The aim of this study is to provide a number of general and technical recommendations in order to plan strategies and actions in support of improving cycling mobility in Monza. The creation of a complete cycle network, even though it will take some years to be achieved, will require:

- Infrastructural interventions on the cycle network;
- Interventions for the improvement of complementary services, like parking facilities, rentals, repairs and maintenance;
- Communication interventions and “marketing” of bicycle use.

The realization of cycling routes is often not enough to hit the target of shifting the urban modal split towards forms of sustainable mobility, as alternatives to the use of a private motorized vehicle; the realization of these infrastructures must come together with a series of stimuli and incentives. On the other hand, the use of promotional and marketing campaigns to promote cycle use might prove self-defeating when users do not find the right conditions; .i.e. when the infrastructure is not there to support their choice.

An approach to cycling in urban areas – particularly as a support to commuters – should consider the necessity of its integration as a mode within the general transportation system of the town, exploiting intermodality. Making the change between different means



of transport – from public forms of transport or car to bicycle – comfortable and easy (e.g. placing car parks at the main junctions outside the town centre) can reduce traffic congestion in the urban road network.

### **3.1.2 Structure of the Study**

In order to meet the study aims, the study has developed the following themes:

1. An examination of the current cycling in the city of Monza; (consideration of strengths and weaknesses of the infrastructure, its safety and its accessibility)
2. Consideration of a proposed cycling network,( integrating the present with a series of possible routes) based on what has already been proposed in the General Urban Traffic Plan, currently being updated by the municipality ;
3. Consideration and development of cycling routes, considering the value of different types (restricted bikeway, bike lane, multi-use path, etc.) and proposing solutions to possible conflicts with the road network (crossroads, road signs and markings, traffic dividers, etc.), in order to adopt a consistent approach of action across the whole cycle network;
4. identification of suitable actions to promote sustainable mobility in the city, in order to reduce the use of private motorized vehicles and making cycling more appealing;
5. investigating the opportunity of launching a 'Bike Sharing' service in the city.

The study has been conducted by eng. Francesco Seneci and eng. Francesco Avesani (Netmobility srl) in collaboration with eng. Marco Passigato (for the abacus of the urban cycling).

# 4 Strengths and Weaknesses of Cycle Mobility in Monza

## 4.1 Analysis of the Present State of Cycling

### 4.1.1 Characteristics of the Territory and Asset of the City of Monza

The city of Monza, head of Province of Monza and Brianza, is located in a densely populated and built-up area, to the north-east of Milan on the road from Milan to Lecco.

From a geographical point of view the town is placed in a mostly flat area, at the average altitude of 150 m above sea level, which is perfectly suitable for the development of cycling.

The model of expansion of the urban area, developing around an old town centre with a series of districts disposed in a circle – the further from the centre the less dense – is ideal for the use of bicycle.

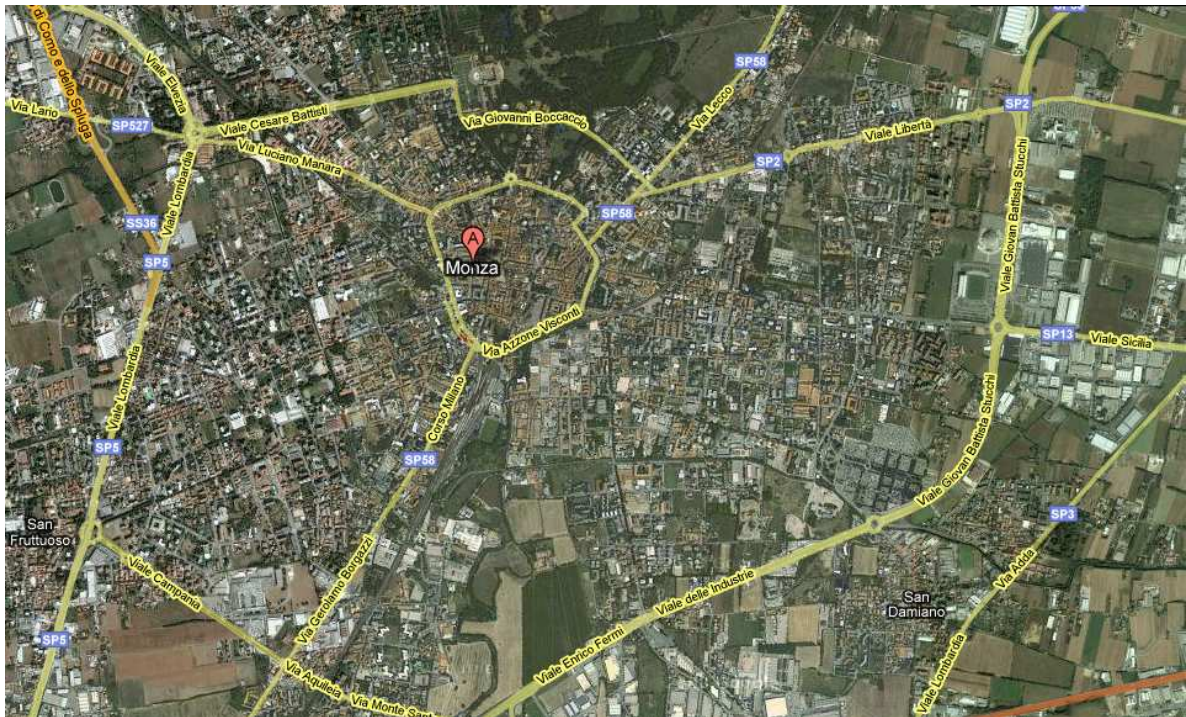


Figure 1 – Aerial Photograph of Monza

Excluding the most peripheral districts, which are located outside the primary ring roads system (San Fruttuoso, San Rocco and Sant'Alessandro, Sant'Albino), the urban site could be contained in a circle of 5 km of diameter, within which the great majority of the population lives (123.000 residents).

In the traditional planning of urban mobility it is usually assumed that distances up to 5 km can be regularly covered by cyclists without special training in a time which is perceived as acceptable by travellers (less than 20 minutes, assuming an average speed of 15 km p.h.). Therefore, theoretically, despite current lack of supporting infrastructure it is evident that bicycles have to be considered as a form of transport to be widely promoted.

Besides the advantage that Monza is flat, Monza has additional advantages for developing its policies in favour of cycling. These are:

- a strong demand for cycling (this is known from the number of bicycles circulating in the town), which is particularly high in the central districts (town centre and adjoining districts) and at some particular sites (e.g. the train station);
- a network of cycling routes which, although still incomplete, serves several connections between attraction centres and offers some quality routes (e.g. the path along Villoresi Channel, or the network of cycling routes of Via Foscolo and Via Tintoretto). These have to be considered as essential elements in the development of an integrated cycling network;
- an identifiable system of residential areas, located away from the huge traffic flows across the town and from district to district, which, if seen as “environmental precincts” (given specific use of road signs and/or physical dividers aimed at traffic calming), can encourage use of bicycles.

Practically, however, the present development of cycling in Monza is limited by the following problems:

- There is no real cycle network; we have, on the contrary, a group of cycle paths, some of them of high quality, but not always interconnected, which usually do not cover large areas of the urban site, especially with regard to the radial connections between the districts and the city centre;
- The density of built-up sites and the presence of narrow roads, in many cases even narrower because of the presence of parking places, or because they are one-way roads, make the circulation in the districts just outside the town centre quite difficult;
- Several natural barriers (the river network of river Lambro and Villoresi channel) and artificial obstacles (a network of freeways and the railway), both of which can only be crossed at certain points (bridges, subways, flyovers). This makes access less direct and routes even more complicated (sometimes really twisted cycling routes routes going from district to district.)

We can also add that, over last year, the whole system of cycling has not been promoted with any consistent policy. The reasons why cycling routes have not been realised is because there has been little or no:

- coordination between different stakeholders on the territory,
- improvement of complementary services, like parking facilities, rentals, repairs and maintenance
- development of a cycling network, or cycle parking areas,

- System of integration with other means of transport,
- successful marketing actions.

Currently the sum of the existing cycle routes within the borders of the municipality is about 23 km in total<sup>1</sup>. The routes are shown in Table 5 of the appendix.

## 4.2 Some Frequent Problems

### 4.2.1 Cycling and One-Way Roads

The extensive use of one-way roads in the road network in the urban site of Monza, particularly in the city centre and neighbouring districts poses significant problems. Roads are narrower and there is often a large number of parked cars which causes additional problems for cyclists.

Frequently, the result is that either cyclists are deterred from using bicycles in these areas or it encourages forbidden behaviour, such as travelling against the traffic which has significant safety implications..

In Monza this problem is particularly evident in the area of the old town centre and in the connections between the city centre and the districts of the first ring. Eastwards, the emblematic case is via Bergamo, where the presence of two opposite one way-roads interrupts a bikeway which is widely used by cyclists, leaving very difficult alternative routes. The same situation may be seen in the districts of San Biagio and San Gerardo.

### 4.2.2 Cycling Routes in Access Roads with Parking Places

Currently, there is a network of access roads or driveways for small private parking areas (for houses or shops). Many are registered, especially along main roads: e.g. in the case of Viale Battisti and Via Foscolo.

Whilst such a solution is not forbidden by the law, it is problematic because of the consequent risks coming from the shared space of both bicycles and cars manoeuvring in to enter or exit parking areas. Therefore, where possible, this solution should not be adopted: e.g., when the need of parking areas is not particularly urgent or when there are alternative sites nearby, the parking area can be shifted or eliminated in favour of the circulation of bicycles.



*Figure 2 - Cycling routes in Access Roads with examples of Parking*

<sup>1</sup> The sum has been made measuring the length of the paths that prove actually useful for the connections; paths on both sides of a road have not consequently been considered as two different cycling routes, but as parts of a single one.

Where the use of such spaces comes to be suitable either for the linearity of the bikeway or for the strict necessity of parking places, it is preferable to adopt a series of interventions in order to:

- highlight the separation between parking places, driveways and cycling routes, e.g. with a different paving and/or coloured paving, or at least with clear road markings;
- install clear road signs, so that such sections are defined not as cycling routes or multi-use paths, but as '*shared roadways*';
- locate parking places so that they do not disturb the circulation of bicycles; in some cases, moving parking places along the edge of the road and/or shifting the bikeway on the external side may be a way to reduce the risk of collisions and avoid cars crossing the bikeway.

#### **4.2.3 Crossing of Intersections**

In the case of a cycle network, the structure and the road control systems at crossroads often do not take into account the necessities of cyclists; in worst case scenario, routes are not suitably connected at the most dangerous crossroads for cyclists.

The most significant examples are:

- the absence of any kind of sign for cyclists on the route they should follow when crossing a junction between two existent cycling routes;
- the absence of pedestrian and cycle crossings;
- the presence of pedestrian but not cycle crossings, which force the cyclists to get off the bike and cross on foot in order to respect the rules of the road;
- the absence of road signs to indicate the presence of crossing bicycles to drivers;
- the absence of traffic lights for bicycles next to the one for pedestrians, in the case of crossroads with traffic lights.

In Table 5 of the appendix, main sites where such problems were evident are highlighted. Instances where it would be sufficient to improve the pedestrian crossings by adding signs for bicycles have been divided from instances where a more important intervention of restructuring of the space would be necessary.

#### **4.2.4 Road Signs and Road Markings for Cycling routes**

The installation of road signs and markings is obviously the main instrument to clearly identify the cycling network.

In Monza there are several inconsistencies between road signs and the type of route, which should be resolved. In particular the habit has been to install a sign of "end of bikeway" at each intersection or crossroad, thus removing the possibility of crossing safely. However, the pedestrian crossing or cycle and pedestrian crossing, where correctly marked, can be an integrated part of the bikeway, and therefore represents a point where the cyclist has right of way.

In fact art.122 Reg. of Italian Rules of the road points out the necessity of installing identification signs "*after every interruption or crossing*", but does not require a sign of "end of bikeway" before the interruption; in fact, this sign is to be installed only at the very end of the route.

In Monza many of these inconsistencies have been highlighted in the majority of cycling routes.

### **4.2.5 Cycling in the Limited Traffic Area**

While the “pedestrian area” ordinarily is intended as an area reserved for pedestrians, a “limited traffic area” is an area where both pedestrian and bicycles – together with special vehicles like ambulances and vehicles for disabled people – are allowed to circulate. However, according to the comma 4 art.182 CdS (Italian rules of the road), cyclists must get off their bike as they represent a danger to pedestrians.

Within the limited traffic area in the historic centre of Monza, bicycles have the right to circulate freely. However, it might be useful to study the possibility of having some reserved cycling routes in areas where there are increasing numbers of pedestrians. It would be necessary to identify the most suitable routes for cyclists willing to cross the historical centre.

## 5 Framework for Urban Cycling: Construction Criteria and Possible Realisation of Cycling Routes

### 5.1 Aims of a Framework for Urban Cycling

The aim of the framework is to provide guidelines for planning and realisation of:

- a cycle network,
- the restyling of existing cycling routes, both main and secondary paths, either as bike lanes or shoulder cycling routes or cycling routes placed inside an environmental precinct.

These guidelines will be a useful and effective instrument for Municipality Technicians in charge of cycling mobility, but also of private societies which could possibly undertake the development of cycling routes within the territory of Monza.

The abacus is therefore only a report of organized and explained examples of cycling routes, but it is also a report of possible solutions to specific problems (i.e the crossing of intersections, the installation of bus stops along the bikeway, the realisation of the most suitable bike park in each context, the possibility of realising bike lanes against the traffic, etc.)

In this sense, the aim is also to give consistency to the infrastructure, (from constructing details to information panels and road signs and markings).

### 5.2 Types of Cycling Routes

The different types of cycling routes are defined by the Rules of the road and by the D.M. 557/1999:

1. restricted bikeway
2. bike lane
3. shoulder bikeway
4. multi-use path
5. shared roadway

In the following section, each type of cycle route will be discussed in turn.

### 5.2.1 Restricted Cycling Routes

The restricted cycling routes, both one-way and two-way, must be physically separated from the roadway, thanks to suitable traffic dividers that must be physically insurmountable. According to the art.7 D.M. 557/1999 the traffic divider must be not less than 0,50 m wide.



A two-way path must be minimum 2,50 m wide, and can be reduced to 2 m only in short sections. A one-way path must be 1,50 m wide, reducible to 1 m in short sections. When the path is densely used it is preferable to widen these measures.



Figure 3 - Example of restricted cycling routes

### 5.2.2 Bike Lane

A bike lane is drawn out of the roadway, and must be one-way, going in the same direction of the roadway, and normally located on the right side of it. As a divider, it is sufficient to have:

- a road marking, consisting of a yellow longitudinal line 30 cm wide, 12 cm far from the white line of delimitation of the roadway.
- a plastic element, called "lane definer" by the Rules of the road.



Figure 4 - Example of bike lanes



A bike lane, which is necessarily one-way, is a minimum of 1,50 m wide reducible to 1 m for short sections. In the case of densely used routes it is preferable to widen the measure.

### 5.2.3 Shoulder Cycling Route

This type of path does not have a specific definition in the Rules of the road, but is defined in the art.6 D.M. 557/1999 as, “a bike lane, drawn out of the sidewalk, that can be both one-way and two-way when the width of the sidewalk allows it without dangers or obstacles for pedestrian circulation; it is normally located between the sidewalk and the roadway”



A shoulder bikeway has the same dimensions as the restricted bikeway (2,50 m reducible to 2 m for two-way paths; 1,50 m reducible to 1 m for one-way paths).



The dividers of the shoulder bikeway from the roadway should be “physically insurmountable dividers minimum 0,50 m wide”.

Dividing elements between pedestrians and cycling areas should also be carefully considered, in order to avoid possible interferences between the two groups of users through a clear perception of the borders of each area.



Figure 5 - Example of shoulder cycling routes

### 5.2.4 Multi-use Path

Multi-use paths are normally located inside parks, or in areas where circulation is mainly on foot, or in parts of the road outside the carriageway, above the level of the street or otherwise divided and protected from it, and usually meant for pedestrians (e.g. pavements). The area of the road that is meant to become a multi-use path should have a reduced circulation of pedestrians, and a few attractions for pedestrians (shops, residential areas, etc).



A multi-use path should be suitably larger than the minimum width of cycle paths (2,50 m for two-way paths, 1,50 m for one-way paths). Characteristics of dividing elements are similar to those described for cycling routes.



Figure 6 - Example of Multiuse paths

### 5.2.5 Shared Roadways (on Roads with Reduced Traffic)

The shared roadways, where bikes circulate together with motorised vehicles, are clearly provided by the law (D.M. 557/1999). The important element in the law is that there is a possibility of realising such routes “in order to give continuity to the network of cycle paths, in a situation that does not allow, for economic reasons or for lack of sufficient room, the realization of restricted cycling routes”.

At the same time, this rule contains suggestions on how to make such routes safer, by introducing elements aimed at reducing vehicles’ speed, such as elevated pedestrian crossings, environmental precincts, speed bumps, etc... in order to reduce the difference between the speed of the motorized vehicles and the one of the bicycles travelling in the shared space.

### 5.2.6 Bike Lane Against the Traffic

In relation to travelling against the traffic, the law does not provide such a solution; in fact it actually forbids it as a rule, because it is considered dangerous. Despite this fact, this solution can be often important or necessary from the perspective of the continuity of the cycle network and its use. The above mentioned D.M. 557, art. 6.4, states that “... *except for special cases, for which the road safety must be specifically certified, particularly with regard to crossroads, the use of two-way bike lanes located on the carriageway is not allowed*”.

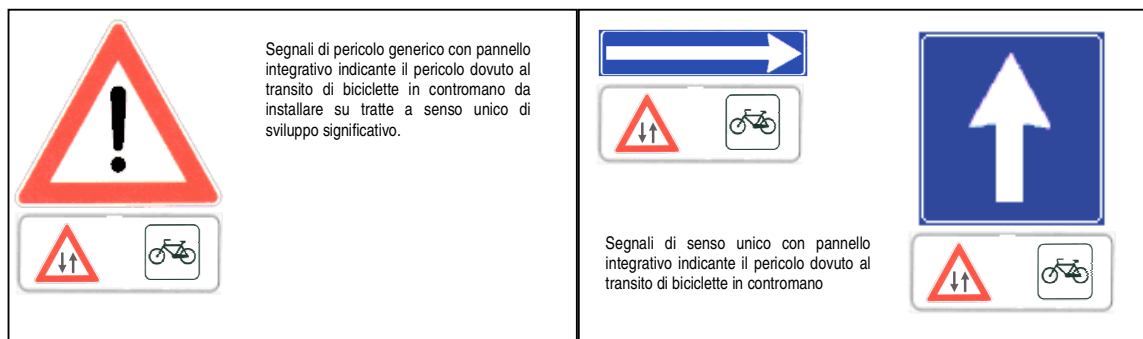


Figure 7 - Road signs for bike lanes against traffic

Another solution for the problem of using lanes against the traffic or for the use of bike lanes for the two-way circulation on one-way roadways could be to regulate the traffic on that roadway as two-way, while forbidding the circulation in one of the two directions to some categories of vehicles. In this case the two-way traffic is meant only for bicycles, while the traffic is free for any kind of vehicle in only one of the two directions of the road.



Figure 8 - Examples of bike lanes against traffic

### 5.2.7 Bikes Routes on Bus Reserved Lanes

Although the circulation of bicycles on bus reserved lanes is regarded as dangerous it may also be responsible for delays to public transport, in some particular cases. When there is no suitable alternative for the circulation of bicycles, the bike route can run on the bus reserved lane, but only for short sections with a limited circulation of buses, and possibly where there is no bus stop. When this happens, the fact that circulation of bicycles is allowed must be marked with suitable road signs and markings.



Figure 9 - Example of a bike route on a bus lane

## 5.3 Elements and Important Problems of the Cycle Network

### 5.3.1 Crossroads and Pedestrian Crossings

The main appeal of a cycle route is for cyclists to circulate in a segregated space rather than on carriageways; this not only gives a real or perceived safety of the route but also the fact that they have right of way on the bikeway at the various types of crossroads and

intersections, from driveways to busy access roads. However, it remains important that cyclists and pedestrians respect one another in their circulation.

Art.40 of Italian Rules of the road states that drivers should behave in the same way in proximity of both pedestrian and cycle crossings: give priority to pedestrians and cyclists that have already begun the crossing at the arrival of the car.

Road markings must be drawn in a uniform way on the whole territory in order to ensure the identification of the cycle network of which each bikeway or path is part. Italian Rules of the road prescribe the delimitation of cycle crossings with two lines of squares measuring 50x50 cm; the distance between the internal edge of the line of squares and the pedestrian crossing lines must be minimum 1 m for one-way cycle paths and minimum 2 m for two-way cycle paths.

In the case of a shoulder bikeway only one line of squares next to the pedestrian crossing lines is to be drawn.

Between the two lines of squares and / or the pedestrian crossing lines the road surface should be paved in red, with the symbol of a bike on them; these symbols must be drawn in white and correctly placed in the direction travelled by motorized vehicles.

With regard to road signs, the following signs must be installed:

- a sign of “cycle crossing” to forewarn of the transit of bicycles;
- a sign of “cycle crossing” to warn that the carriageway may be crossed by a bikeway, signalled by suitable road markings; it is always placed next to the crossing;
- identifying signs for the different types of route after each intersection and interruption, while the signs of “end of bikeway” are to be placed only at the very end of the route and not before the crossings.



Figure 1 - Cross roads and pedestrian crossings

The crossing at roundabouts is of particular significance. Roundabouts are a problematic element for bicycles’ circulation. There are different solutions to this problem, depending on the diameter of the roundabout and on the amount of the traffic crossing it.

For cycle lanes that cross roundabouts with a diameter less than 30-32 m, the solution called “Banane Vélo” is to be recommended. For larger roundabouts, where the speed of vehicles travelling on the road is higher, it is preferable to shift the circulation of bicycles onto the sidewalk, with adequate road marking delimiting the cycle route from the part of the sidewalk devoted to pedestrians. In roundabouts located in urban areas bikes can travel on the bike lane placed on a ring next to the carriageway.



Figure 2 - Example of Banane Vélo roundabout



Figure 3 - Examples of cycling routes in roundabouts

### 5.3.2 Traffic Dividers

In defining the construction criteria of cycling routes, art. 6.2 of D.M. 557/1999 states that the bikeway can be restricted, one-way or two-way, when located in a physically separated area, different from the ones for motorised vehicles and for pedestrians, through suitable traffic dividers that must be physically insurmountable; these dividers, according to art.7, must be minimum 0,50 m wide.

It is evident that this rule can be interpreted in many ways with regard to the idea of a “suitable” and “insurmountable” traffic divider. The dividers can be chosen according to the type of path they are meant to protect, the type of road they are placed onto, and to the urban context they are located in, but in any case they must respect the following characteristics:

- actual physical protection of cyclists;
- permeability to rain ;
- accessibility to cyclists and, where possible, to pedestrians;
- insurmountability by parked vehicles.



Figure 4 - Examples of traffic dividers

## 5.4 Additional Services

### 5.4.1 Road Signs

The access to a cycle network by regular and new users is encouraged by a use of clear road signs. Road signs are important aspects for the general identification of a “bike system”.

These signs are different from the compulsory ones provided by the Rules of the road; they contain detailed information and communication: they can provide details about distances and directions of various destinations of the network, and, they represent a strong advertising element for cycling, through a clearly visible and accessible appearance.



Figure 5 - Different road signs for identification of a "bike system"

### 5.4.2 Bike Parkings and Bike Services

In order to promote cycling mobility, among the basic services to offer to cyclists are opportunities for safe cycle parking

Having a policy for cycle parking is critical if cycling is to become more common. There are a number of different types of cycle parking, with different levels of complexity and organization, that need to be located near to relevant attractions/ centres according to the different needs. These are:

- ✓ Bike ranks
- ✓ Bike shelters
- ✓ Bike boxes and bike stations



Figure 6 - Bike racks



Figure 7 - Bike shelters



Figure 8 - Bike boxes



Figure 9 - Bike station



## 6 Planning the Cycling Network

### 6.1.1 A Cycling Network in the City of Monza

The strengths and weaknesses of cycling in the city of Monza have already been examined in detail in Chapter 4. The following section outlines recommendations and proposals for the development of a cycling infrastructure that will support the increasing number of cyclists. Recommendations and proposals concerning additional services (such as bike sharing, marketing, etc) will be examined later in the report.

The planning of a cycling network is an essential step towards the construction of a cycling system which is likely to work as an alternative to traditional road system used by private motorised vehicles.

The “cycling network” is not only the sum of a series of cycle routes, but also an integrated system of well-connected cycling routes, that pays adequate attention – something that is often insufficient nowadays – to the problem of crossroads and intersections, with consistent choices about the colour of the road surface and about road signs and markings, so giving clear and unmistakable information for both cyclists and drivers.

Identification, availability, continuity and safety are essential prerequisites of a cycling network, and they must be carefully considered in the preliminary phases of the project.

Considering the characteristics of built-up areas of the town of Monza and of its road system, on which the cycling system necessarily relies, the vision of a complete cycling network for the city is based on the following priorities:

1. The historical centre represents the geographic and functional centre of the town which has to be considered in planning the system.
2. A system of radial cycling routes must be drawn, starting from the suburbs and outskirts of the town and directing to the city centre, which will also work as a connecting system between the districts of the first and the second ring (see table 5 in the appendix).

Some sections of these radial routes have already been built (via Foscolo eastwards, viale Brianza and viale Regina Margherita northwards, via Sempione westwards and via Carnia southwards) and these must be the first to be completed; but the project also plans to build new paths in order to create new connections between areas that are not served yet. The main ones are: viale Libertà for the area of Libertà, the prosecution of via Lecco for the district of San Gerardo, via Rota for the district of Cederna, via Buonarroto for San Donato, via Salvadori and via Sant’Albino for Sant’Albino, via Borgazzi for Casignolo, viale Romagna and via Marsala for San Fruttuoso and San Giuseppe, via Cavallotti and / or via Monte Bianco for Triante and San Carlo, via Boito for Cazzaniga.

3. The path along Villoresi Channel constitutes the backbone of a system of ring paths around the town centre, and it strategically runs on the border between the districts of the first ring and the ones of the second ring. Accurate improvements and the construction of new paths eastwards can be studied, from via Buonarroto

towards the hamlet of Sant'Albino.

4. Other radial routes around the town centre should be added to the bikeway of Villoresi Channel, meant to connect the districts of the second ring and to collect cycling flows from the suburbs, leading them towards the radial routes that cross them. Some examples of cycling routes with this destination are: via Canova, for the connection between San Gerardo and the path along the railway, viale Stucchi nearby the stadium and the sports hall, viale Fermi between San Rocco and San Donato and via Monte Santo and via Aquileia in San Rocco, in order to complete an external ring that goes from San Fruttuoso to San Donato; via Cervino and via Calatafimi, in order to complete an internal ring in Triante and San Giuseppe, based on the already existent bikeway of viale Europa; the paths of via Clementi and via Ramazzotti aimed at serving the hospital and connecting the two radial routes of via Boito and viale Brianza.
5. Overcoming the natural and artificial obstacles (River Lambro, Villoresi channel, freeways and railway crossing the city of Monza) will guarantee cyclists in terms of safety and as far as the length of the route is concerned; it will be necessary to create routes which are not too long, because otherwise cyclists will prefer to take shorter (though not served and more dangerous) routes instead of using the cycling routes.  
The problem of crossroads and intersections must be considered from the same perspective: the attention paid in planning and building them, together with the installation of correct and clear road signs and markings, makes the difference in the quality of the results and in the safety and accessibility of cycling routes.
6. Considering the role of Monza as the chief town of the Province, the connections with the neighboring towns must not be ignored; coordination in the preliminary and planning stages of the project is essential. In this sense, the existing cycling routes of via Lecco (town of Villasanta), via Adda (towns of Concorezzo and Brugherio), via Baradello and Villoresi (town of Muggiò), viale Brianza (town of Vedano al Lambro) are already very important.

The task of developing a cycle network will also have to serve the highest possible number of attraction centres (schools, sports centers, hospitals, public offices, churches, halls, junctions of modal interchange), with paths as near as possible to these centres. Other considerations are the need of shared space when it clashes with other demands (e.g. parking places) and the costs must be correctly balanced in this perspective.

The variables involved in the study in order to develop a cycle network are:

- the proposals contained in the General Urban Traffic Plan which is currently being updated by the municipality of Monza;
- the rationale for each bikeway, (route fulfilling specific target of the path, connection between districts, connection to schools or public offices, local connection, etc) but also the general target of serving all the connections which are not served yet;
- the choice (which is still preliminary at this stage, and will have to be checked in the advanced stages of the project) of the type of cycle route to be built, according to the dimensions and functions of the infrastructure that the route will have to serve.

The technical features of each of these types and the best ways to build them have been discussed in Chapter 5.

The realisation of the paths of the advanced cycling network – as planned in the project – would bring the cycling network to a higher level of service with regard to the accessibility of attraction centers identified in the preliminary stage of analysis.

Assuming that each centre of attraction is served by the cycling network if the distance between a bikeway and the centre is less than 100 m (see the circle buffer areas around the junctions, in the tables), thereby the proposed cycling network would serve 80 % of the city attraction centres, compared to 30 % currently .

In Table no.5 an attempt has been made to draw a series of routes in order to complete the cycling network..

However, the above mentioned calculation must not distract us from the real target to be hit when realising a cycling network, which is not only to “offer cycling routes” but also to obtain more trips by bike! The right index then is not the one that measures only the network extension, but the one able to indicate the modal split of the urban mobility, testing how many more people get to use the bicycle if the network is put into operation.

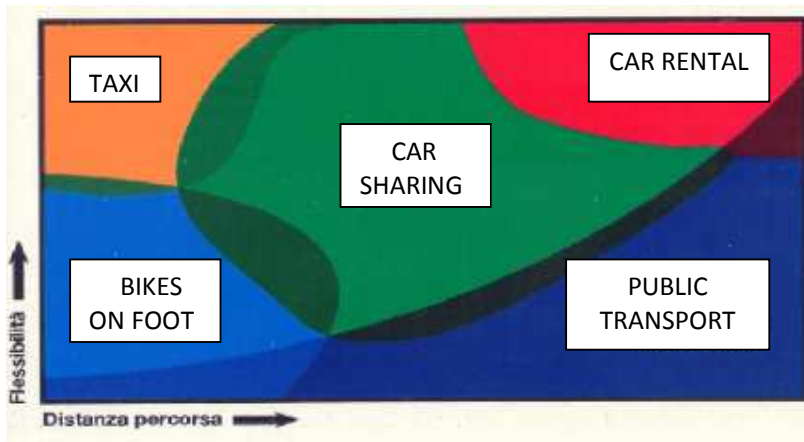
In this sense it may be preferable, when managing the economic resources of the project, to realise an even smaller number of paths, but with a high quality standard that guarantees its maximum accessibility and comfort; on the other hand, it will also be recommended to serve the non-served areas and connections in the first place, since the potential or explicit demand for cycling is likely to be stronger there.

In conclusion, the effectiveness of the agenda for the realization of the “Bike Plan” of Monza will be judged on its capacity to increase the number of journeys made by bike by residents

## 7 Steps Towards the Creation of a “Bike System”

### 7.1 Cycling as the Ground of Multi-modality in Monza

The main road to sustainable mobility today is the so-called “multi-modality”, a mobility system which offers a choice between different forms of transport according to the demand, the length of the journey and the context in which it is made, following the general scheme presented in the picture below.



In this sense, it will be important for the town of Monza to monitor the “modal split” of the urban mobility, setting a realistic target the shift of the highest possible quantity of mobility from the use of private motorised vehicles to the use of public forms of transport and / or bicycles.

Figure 10 - Multimodality mobility system

Travelling by bike and on foot seems to be the simplest, most direct and cheapest form – besides being the most sustainable – to move within a urban context such as found in Monza, which is based on a system that has its geographical and functional centre in the old town centre, and on a built-up area that can be contained in a circle of 5 km of diameter, leaving outside the most suburban areas.

Considering the fact that the distance of 5 km can be easily covered by the average cyclist for regular daily and systematic journeys as well as for occasional ones, it is evident that the potential for cycling of this territory is enormous and should therefore be exploited.

### 7.2 A Global Vision: Integrating Cycling with Other Forms of Transport as a Strategy for Intermodality

Following on from the previous sections, cycling development must not be an isolated target; in fact, it must be seen as an additional method of promoting intermodality. Contributing to the totality of all infrastructures and of complementary interventions (services, communication, bike sharing, etc), in order to promote modal split from private motorised vehicles to alternative, more sustainable forms of public transport.

So, cycling can be seen not only as an opportunity to change the modal split of the urban mobility of Monza's residents, but also as an occasion of changing the type of incoming traffic from outside Monza, e.g. shifting it towards buses or trains.

This logic works for every kind of "mobility chain", but it is particularly suitable for the medium-length journeys between the different towns in the province of which Monza is the chief town and therefore the centre of attraction; these distances are today most commonly covered by car or other private motorised vehicle. This is why cycling development must also deal with the improvement and promotion of the modal interchange junctions, such as train and bus stations.

These interchange junctions will have to be equipped with bike stations and complementary services such as bike repair shops, guarded bike parks, bike sharing stations and everything that can contribute to communicate the comfort and easiness of modal interchanges to potential users. Indeed, the crowded, guarded bike park outside the train station is in itself a perfect indication of the demand for such services.

In this sense the municipality will have to keep following the strategy of revamping areas around the train stations on both sides of the railways, finding the right location for bike parks so that the distance to be covered on foot for the train-bike interchange is the shortest possible, and improving the overall services offered to cyclists. In few examples, a good sheltered gangway for the distance to be covered on foot will be sufficient.

Even if, in the future, interchange car parks in the suburban areas will be built in order to reduce the incoming traffic towards the town centre, it will be important to initiate an integrated plan of cycling routes as this will allow travellers to reach them, (together with the additional bike parks and bike sharing services).

### 7.3 Increasing Pedestrian and Cycling Mobility

In order to promote a system of pedestrian and cycling mobility it is important to modify residents' habits, by overcoming their main resistance to change.

Interventions will aim to improve cycling and pedestrian routes initially, in order to make them more attractive and appealing, safer, more complete and competitive than present with regard to travelling times and traffic flows, as introduced in section 3.1. Following on from this it is essential to respond to mobility demand through effective communication, by providing accessible information and marketing material. This approach has proved to be very successful in European experiences; in particular, promotion of cycling can provide the added impetus to reach a targeted change in modal split.

There are therefore many ways to build a successful cycling system, but the most strategic ones relate to four specific aspects. Each will be discussed in the following sections:

- Paths of the network
- Parking areas
- Services (parking facilities, rentals, repairs and maintenance)
- Information and Marketing.

## 7.4 Criteria for the Creation of a Cycling Network

### 7.4.1 Characteristics of a Good Cycle Path

Both when improving the existing cycle path network and when creating new paths, it is essential that any development should be based on the following criteria:

- identification;
- accessibility;
- usability;
- continuity.

### 7.4.2 Restyling Existing Cycling Routes

As already stated in the previous paragraph, though in some cases this is not an immediate priority, the plan for the cycling network, besides creating new paths, should schedule revamping and improving existing cycling routes so that the whole network has uniform characteristics. Such interventions will be realised following suggestions given in the constructing criteria for Urban Cycling (widely summarised in Chapter 5).

In most cases these interventions are meant to standardise road signs and road markings in accordance with the Rules of the road, or to enforce safety systems at crossroads and important intersections.

It is also to be hoped that the chosen types of materials and colours for the road surface and signs will be uniform in the whole network.

In general, and for economical reasons too, we think that cycling routes should be paved, with clear and understandable road markings, which will be generally white, and that the road surface should be painted in red at crossings, in order to make them even more recognisable not only by cyclists but also by drivers.

### 7.4.3 The Creation of Environmental Precincts

In the previous discussions some problems for the development of cycling within residential districts have been identified. These are:

- the impact of single or combined elements such as traffic of motorised vehicles in peak hours (caused by the fact that many people choose alternatives to the main roads) in order to avoid congestions.
- crossing residential areas at high speed; a similar problem is due to the organization of space which is frequently unbalanced in favour of the circulation and parking of motorised vehicles.

Several districts in Monza present these problems. Solutions to these can be found in the creation of the so-called “environmental precincts”: the area of San Biagio between viale Manara, viale Battisti and via Regina Margherita, the areas of Regina Pacis northbound and southbound via Mentana, the area of San Carlo between via Cavallotti and via Marsala, the heart of the hamlet of San Fruttuoso are some of the examples of the areas that could be used as environmental precincts, either in extended zones or in single specific roads.

Within the network of the urban road system, in the areas of local streets only, the denomination of “environmental precinct” is given when, “*there is the will of reintroducing and exploiting the necessities of pedestrian circulation and of parking to the prevalent benefit of the residents and workers of the area*”, .Such areas are indeed characterised by the fact that pedestrians and bicycles have right of way over motorised vehicles, and that the speed limit is 30 km p.h. Such a measure gives proven benefits, including increasing road safety and improving the quality of life of the area.

The interventions will therefore be aimed at reducing the speed of motorised vehicles crossing and entering the area, and to improve the safety of pedestrian and cycling paths and crossings. A series of techniques of planning and organising circulation will be created, in order to allow the shared circulation of motorised vehicles, bicycles and pedestrians in a safe context.

This kind of intervention is generally known as “traffic limitation” and includes the installation of entrance gates, chicanes, boards or elevated crossings, parking roads etc.

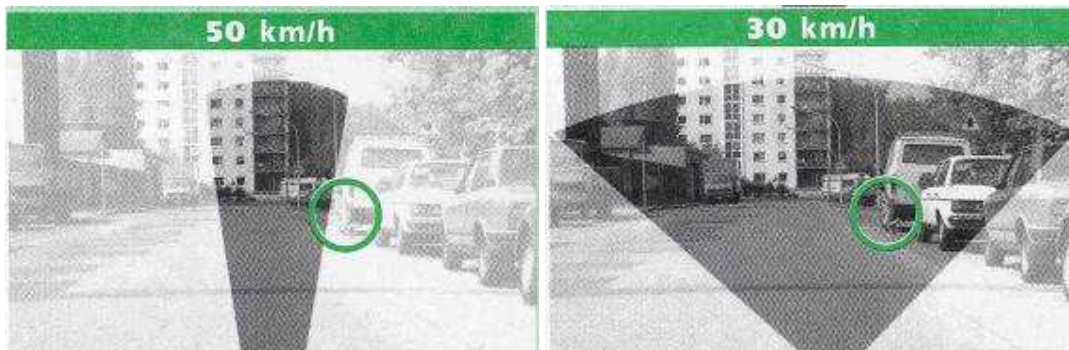


Figure 11 - Speed limits influence visibility

## 7.5 Bike Parks and Other Services for Cycling

Besides interventions to the cycling network infrastructure, additional services for cyclists are required. Essentially these services are bike parks and a bike sharing service. They represent additional services that will improve the chance of take up as an alternative to a system based on the use of motorised vehicles.

With regard to bike sharing service, Monza could start a third generation bike sharing service in the short term. This is discussed in more detail in Section 8.

With regard to bike parks, a plan should be drawn aimed at finding the most suitable location for them, and at choosing the most suitable type of bike park accordingly.. According to priorities and necessities, it will then be possible to provide the right number of bike parks for the town.

Type of bike park (see section 5.4.2)	Location
Bike station with boxes and / or sheltered and guarded bike parks	Train station Other main interchange junctions
Bike parks / sheltered bike ranks	Main centres of attraction (hospitals, universities, sports hall, etc.) Main sites of the old town centre Interchange car parks Main interchange junctions of the public transport on road
Bike ranks	Widespread distribution in the town centre Bus stops Shopping and commercial venues

Table 1 - Suggested locations for different types of bike parks

## 7.6 Information and Marketing

The first target of communication is about the identification of the cycling network as a whole: it must be clearly recognisable by everyone, especially by cyclists using it occasionally or for the very first time. Road signs and markings must always be present in accordance with the Rules of the road, in order to assure the observance of the law and ensure road safety.

However, in order to give importance to the system of cycle transport, besides the creation of routes and of the network it is really useful to install information panels that in addition to providing information about distances and directions for various destinations also work as advertisements for cycling promotion thanks to a clearly defined and functional appearance. Please see Section 5.4.1. for some examples of signs.

From these examples, it can be seen how essential it is to give a clear identity to the system of cycling mobility. Firstly, through an image that is clearly recognisable from the outside, and secondly, one that is successfully synthesized in the logo, as seen as a graphic instrument which has impact.

After defining the characteristics of the identity and of how the existence of the network is communicated it is necessary to design a marketing campaign based on a well-constructed image that is recognisable to all citizens. This is important as it needs to reach all citizens in order to widen the group of potential cycle users. Indeed, the cycling system is to be seen as a new service to be launched on the market.

While improving these actions and the communication strategies in general, it is really useful to involve citizens throughout the process in order to generate interest and hopefully make them more sensitive and interested in using the “bike system” of the town. With this in mind, some useful initiatives would be :

- school campaigns with dedicated projects to be discussed and shared with teachers, such as participatory workshops, visits in school from skilled staff to teach children how to cycle safely etc;
- events involving the participation of particularly interested subjects (cyclists' unions, but also traders' unions etc.);



- launch of campaigns and calls for choosing the names of each path or for the creation of a logo.

## 8 Bike Sharing Service

### 8.1 Figures of Bike Sharing Service in Italy

The number of bike sharing services organised by municipalities of various sizes has increased significantly in recent years. Compared to the average of the rest of Europe, in most case the systems in Italy are small systems, which are hardly functional for citizens and hardly economically sustainable for the municipality at the same time.

From the report of the “Optimising bike sharing in European Cities” project (December 2009), published on the website [www.obisproject.com](http://www.obisproject.com), the following table shows the diffusion of Bike Sharing systems in the Italian towns and cities with more than 20.000 inhabitants, divided according to the population.

	> 500.000	> 100.000	> 20.000	TOTAL
Number of Italian cities per population	6	36	431	473
Number of Italian cities with BSS per population	3	17	105	
Coverage with BSS per type of city	50.0%	47.2%	24.4%	40.5%
Average number of bikes per city	560	100	20	
Total number of bikes (2009)	1,680	1,700	2.100	5,480

Table 2 - Diffusion of bike sharing in Italian towns

The same study produced a projection for the year 2011, according to which the level of coverage of Bike Sharing services will grow approximately from 40% to 69% in the whole, and the number of available bicycles is set to reach 12,000, i.e. twice the present number, leading to a usage rate of 1% of residents.

### 8.2 Different Types of Service

“Bike Sharing” service, as the name suggests, is a system that provides a certain number of bicycles to users for short journeys within the area of a town or city, without users owning bicycles.

It differs from traditional “Bike Rental” service because it does not demand, unlike the latter, the subscription of a contract, or the execution of a whole procedure at the front office every time users take a bicycle; on the contrary, users are free to take the bike whenever they want, after being registered and authorised only when they use it for the first time.

Recently, European experiences of Bike Sharing service have passed through different phases:

- “*first generation*” services, based on a bike sharing service which was neither organised nor managed, and was therefore exposed to a series of risks such as

- vandalism and anti-social behaviour;
- “*second generation*” services, where bicycles collection is mechanical and subjected to the payment of a deposit (coin or token), intended as an incentive for the return of the bike, as is the case for shopping trolleys.;
- “*third generation*” services, which have recently developed electronic systems for the collection and control; thanks to these systems the service has become more flexible but a higher management control is now allowed.

Bike Sharing services can be organized and improved according to different systems both from a technical and an economic and management point of view. It is essential to identify the optimum solution within the context of where the service will be implemented, in order to best exploit its opportunities.

### 8.2.1 Technical Aspects

Technical aspects which make the organisation of a Bike Sharing system different from another one are strictly connected and concern the following:

- flexibility in the choice of location where the bike can be collected and deposited; the points of deposit and collection can be the same or not;
- a system of collection / deposit of the bike which can be totally mechanical, both electronic and mechanical, or totally electronic;
- methods and technologies for maintenance, management, control and check of the system.

The evaluation of these aspects, in Italian experience, can be reduced to the study of only two models, which, with few exceptions (Bozen, Milan) control the market: “C’entro in bici” (mechanical system with a key) and “Bicincittà” (electronic system with a magnetic card).

#### C’entro in bici ([www.centroinbici.it](http://www.centroinbici.it))



Project  
eng. Flavio Tura

How it works  
The system has a totally mechanical method of collection; users receive a codified key which cannot be reproduced (and belongs to users) and are entitled to use any bicycle. When users collect a bicycle, the key with the personal code remains locked in the bike rank, and can be unlocked only by depositing the same bike in the same place.

Figure 12 - Mechanical system of bike sharing

Most recent improvements concern the installation of a solar panel meant to charge a counter that calculates the number and time of use of collected bicycles.

#### Pros

- ✓ The system guarantees a free place on the rank when depositing the bike
- ✓ The cost for the start-up of the service is low

- ✓ The system is good for small or medium towns, where the target is to be identified in citizens, both resident or not, travelling daily on given, fixed routes, which typically include important junctions and centres of attraction that can interest a wider group of people (based at hospitals, universities, industrial areas, office districts etc).

#### Cons

- it is impossible to deposit the bike in a location which is different from the collecting one; this aspect gives no flexibility to the system.

#### **Bicincittà** ([www.bicincitta.com](http://www.bicincitta.com))

##### Project



Comunicare srl

##### How it works

Bicincittà is a third-generation system, and consists of the following elements: the bicycle; the bike-parking; a system of control and administration, and a system of telediagnosis (see below for more detail).

*Figure 13 - Electronic system of bike sharing*

Users collect the bicycle in any bike park through an electronic card, and deposit it in any free bike park, which can either be the same of the collection or not. Once the bike is deposited, it becomes available to any other user, which will be using it independently. Every bike park consists of one or more posts and is identified by an information panel.

The use of a personal magnetic card allows, (through a server that all users are connected to, and to which the administrator has constant access), a general overview of bicycles' whereabouts at every moment. This allows statistics and balances of the use of the service to be made available. The basic information, like the availability of bikes in real time, are accessible also for users on the website of the service.

The telediagnosis system allows to identify possible damages of the bike parks in real time, and, in the most common cases, it also allows the service to resolve them thanks to a system of remote unlock.

#### Pros

- ✓ The sharing level of vehicles is maximised
- ✓ The electronic system allows a constant control on the state of the equipment, the remote resolution of some problems, and the improvement of the service by drawing statistics of the use.

## Cons

- ✓ The maximum flexibility of the service could cause a disproportioned distribution of vehicles at certain times of the day: some crucial junctions may be full causing the impossibility for users to deposit their bike; with a careful examination in the start-up phase, such problems can be minimized or resolved completely. But in some cases costs for the administrator could increase due to the necessity of transferring a certain number of bicycles from one park to another, in order to have a well balanced system.
- ✓ The system is not competitive and is in danger of failure if a minimum number of Bike parks is not installed; the ideal solution would be to make an initial plan of the system considering an average of 1 park every 10,000 inhabitants.
- ✓ Costs are definitely higher than the ones demanded by mechanical systems, since this kind of system requires technological solutions which are not necessary in mechanical systems.

## **Electric bike systems**

The offer of electric Bike Sharing systems has been recently widened, according to the growing concern about sustainable forms of energy.

From a general point of view, the organisation of the service is not too different from the traditional one, with the only difference being that each post of the bike park is also equipped with a system of batteries for recharging electric bikes.

In the case of an electronic system, a display for checking the level of charge and a system of automatic lock of bikes with no sufficient charge can also be installed.

In general, the organisation of a hybrid system, with a proportion of 70 traditional bikes every 30 electric ones, has been suggested.

However, it is evident that, according to costs, which are higher than the ones demanded by traditional bikes, the number of electric vehicles will also depend on the gradients of the area and the average ups and downs that users may encounter in their journey.

In the case of a hybrid system an intelligent system of fees can also be studied, differentiating the fees for traditional bikes from the ones for electric ones.

### **8.2.2 Economic and Management Aspects**

Economic and management aspects of a Bike Sharing service are partly bound to the technical ones (especially with regard to the initial start-up costs of the service), but also depend on the nature of the financing of the system and of its maintenance.

Generally, any problems arise within the wider debate about public services and their financing.

Considering economical problems of many municipalities at the present day, in some cases the service has been undertaken by private societies, which write off the costs of

their investments with the earnings of advertisement franchises given by municipalities as a return.

The risks of such a choice are essentially the following ones:

- for some reason the municipality does not give the contracted number of advertisement sites, or is otherwise forced to increase the advertisement sites in town so that the society can keep the service open;
- due to vandalism and anti-social behaviour additional costs (which were unexpected or higher than expected) may rise, causing a contrast between the municipality and the private society;
- other costs may occur due to the necessity of redistributing bicycles among the various stations, i.e. requiring periodic transport to balance demand and availability.

Therefore, it is generally preferred to leave the direct management of the Bike Sharing service to the municipality. Such a choice will not distort the essence of the service (the concept of “sharing” is clearly a dominion of public and common goods, and is at pains when facing a pure marketing logic; the same can be said about the problem of advertisement); it will also allow a total control of the system and the possibility of revising its characteristics, costs and investments at any moment (a contract with a private society generally represents a 5 -10-year-long bond).

It is evident that the functioning of the service could be a real problem, so that a co-operation with private societies can be estimated, with suitable forms of co-financing, which do not represent bonds that are too strong or too risky for the existence of the service, intended as public.

The costs of a Bike Sharing service can be divided into:

1. purchase, installation and start-up of the service;
2. annual fees and computer administration;
3. maintenance and technical management costs.

1. Costs for purchasing and installation of the structures are very flexible, according to the chosen system (mechanical/key, electronic/card). Although the proportion between the former and the latter has to be carefully managed depending on the required characteristics. It is possible to say that the general cost per bike of a mechanical service is less than a third of the cost of a bike of an electronic service. More precisely, the first goes from 750 to 820 euros per bike and the second from 2500 to 3000 euros per bike (VAT not included).

2. Annual fees for the mechanical system are lower too, because they do not include the updating of websites or complex software, as is required with the electronic system, which is based on a highly sophisticated electronic and computer administration which allows a correspondent efficiency and flexibility. In this case the annual fee for the administration of the website and for the GPRS can be about 500 euros per station.

3. Maintenance and technical management costs that the municipality has to sustain are widely flexible, according to the chosen financing form (see above), and to the outsourcing of some of the services, as the maintenance and repairing of bicycles and parks, bikes transportation (if necessary, in the case of an electronic system), the front

office or call centre service at disposal of users.

A total outsourcing of the system, with a society that provides all maintenance and complementary services, can reach the cost of 700 Euros per bike per year for the municipality. It is therefore evident that the mechanical system is cheaper in this sense too.

The Bike Sharing system with electric bikes has to be considered on its own merits; the costs can be around 4500 – 5500 Euros per bike, and are obviously lower in the case of a hybrid system.

The installation of an electric system can be associated with the realisation of shelters with photovoltaic roofs that, besides covering items in the bike park, can also be larger in order to earn a profit from the purchase of renewable energy in the local net.

### 8.3 Proposals for a Bike Sharing service in the town of Monza

The Bike Sharing service is today one of the services that a municipality can provide in order to improve air quality, management and functioning of the road system, and in general to promote the sustainable mobility.

The Bike Sharing service is surely a contribution to the strategy that aims to widen intermodal opportunities and to the realisation of a multi-modal model, free from an excessive use of private motor vehicles.

Therefore, with this in mind,, the municipality could promote a Bike Sharing system based on the following general elements.

#### Type of system

Considering the characteristics and the dimension of the city of Monza, the flexibility guaranteed by the electronic card system is more suitable to the complexity of the urban mobility than the mechanical system, which forces users to collect and deposit the bike in the very same bike park.

Besides a number of systematic routes which are easily Identified (such as the one from the train station to the old town centre), the general map of cycling mobility in Monza follows the polycentric logic of the town, disregarding the influence of a cycle network which is incomplete in many areas.

#### Integration with other forms of transport

Framed in a number of steps to be made for cycling promotion, the Bike Sharing system has to be planned and organised in close integration with other transport systems. Besides the single and occasional use of the service, the aim is to realise highly efficient synergies between systems of transport that come as alternatives to the use of private motor vehicles, following the logic of the “mobility chain”. Users recognise the possibility of making a pre-determined journey in a comfortable and functional way, using a series of transport systems.

This is the creation of a system of intermodal mobility, based on some strategic junctions, such as the stations of the public transport system, the interchange parks, and some important attraction centers (concentrated, like the hospital, and diffused, like the old town

centre). Integration with other transportation systems, with a particular regard for the public transport, is the most desirable, considering the technology used for the card that may be used both for bike-sharing services and to use public transport.

#### Number and location of bike sharing stations

In order to guarantee the functionality of the system, the third generation systems must have a minimum number of bike parks: starting from a proportion of 1 junction every 10,000 inhabitants (as in Milan), all the way to the system implemented of Paris, where the proportion has even become 1 to 100!

In the case of Monza we think that 10-12 stations (with a total amount of 80-100 bicycles) can represent an appropriate figure in the first start-up phase, in order to study the behaviour of users while planning a second phase of adjustment.

5 or 6 junctions could be located in the crucial points of the town centre, or along its perimeter; a couple of bike parks with a high number of posts should be placed at the train and bus station, that represent the most important intermodal junction of the town, on either side of the railway; the rest of the stations should be located at other centers of attraction, such as the new San Gerardo Hospital and the University in the northern part of the town, the General Hospital of Monza, the fair, stadium district in the eastern part, and the multi-functional area of via Pelletier in the western part.

#### Information and marketing

The start-up of a Bike Sharing service will have to come together with a successful marketing campaign, in order to inform, educate and encourage citizens to use the system on one hand, and to promote the idea of a “public service” in favour of the community on the other. Something that reduces the risk of vandalism and anti-social behavior by making everyone aware of their responsibilities would also need to be considered. The campaign and the messages will have to be integrated with wider initiatives of “marketing of the bicycle and of cycling”.

#### Estimate of the maximum costs

A system with such basic characteristics could demand an initial investment of approximately 300,000 – 400,000 Euros.

Trying to estimate costs of a financial plan over the long term, i.e. about ten years, would have to take into account the costs for maintenance and organisation of the system. This could be probably between 35,000 and 70,000 Euros per year, according to the type of management chosen by the municipality (public management, total or partial outsourcing) in order to keep the service working and efficient.

The estimate with regard to a possible co-financing of the project (the municipality and a private society associated) must be made based on the economic resources at their disposal.

The participation of the municipality of Monza to the public call for Bike sharing services and renewable energies (expiring in October 2010) could surely be a way to obtain a high financing for the planning, start-up and initial promotion of the system (the call, however, does not cover management and organization costs).