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3<sup>rd</sup> International Conference on Road and Rail Infrastructure  
28–30 April 2014, Split, Croatia

## Road and Rail Infrastructure III

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Organizer  
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## ASSESSMENT OF THE DEMAND FOR BICYCLE PARKING INFRASTRUCTURE IN VIENNA

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### Abstract

One of the official goals of the Viennese transport policy is to increase the share of cycling by more than twofold. Investments into cycling infrastructure are the key to success. Besides cycling paths and lanes the necessary infrastructure also includes safe and secure parking facilities. Appropriate bicycle parking facilities are needed at primary locations (home) as well as secondary locations (work, shopping, leisure, etc.). The Research Center for Transport Planning and Traffic Engineering, Vienna University of Technology, recently carried out two different studies concerning the assessment of the demand for bicycle infrastructure. The aim of the proposed paper is to present the results of these two studies.

The starting point is an analysis of the legal framework for on- and off-street bicycle parking in Austria. Existing planning guidelines are compared with international examples from countries and cities with very high shares of cycling. Citywide data about the location of public bicycle stands are analysed. Six case study areas in the city centre, the inner city area, the suburbs and at a main railway station have been defined. Occupation rates of the bicycle stands in these areas have been counted and analysed. A web based survey has been carried out in order to gain data about bicycle parking at private locations (home, workplace). The spatial distribution of the future levels of cycling has been estimated using three different methods. According to the results of our research a total of about 44,000 to 56,000 additional public bicycle stands are needed to accommodate the intended increase in cycling. The highest demand has been identified for the central business district and the districts number 3 and 10, the lowest for the districts number 8, 6 and 5. The investment costs have been estimated with roughly 16 million Euros.

*Keywords: bicycle parking, cycling, future demand, investment costs, Vienna*

### 1 Introduction

One of the official objectives of the city of Vienna as quantified in the Transport Masterplan 2003 is to increase the share of cycling to 8% by the year 2020 [1]. On the 15<sup>th</sup> of November 2010 the city government formulated a new, more ambitious goal of 10% share of cycling by 2015. Investments into cycling infrastructure are the key to success. Besides cycling paths and lanes the necessary infrastructure also includes safe and secure parking facilities. As international experience shows, high shares of cycling in combination with local demand concentrations can lead to significant problems with bicycles parked in public spaces. Appropriate bicycle parking facilities are needed at primary locations (home) as well as secondary locations (work, shopping, leisure, etc.). The Research Center for Transport Planning and Traffic Engineering, Vienna University of Technology (VUT), recently carried out two different studies concerning the assessment of the demand for bicycle infrastructure. A study about future requirements concerning quality and quantity for private and public bicycle parking

facilities named ARNIKA (Anforderungen eines steigenden Radverkehrsanteils an die Qualität und Quantität von Fahrradabstellanlagen – Nachfrage, Infrastrukturkosten und Akzeptanz – Requirements for future quality and quantity of bicycle parking infrastructure to facilitate an increasing share of cycling – demand, investment costs and acceptance) was commissioned by the Viennese Environmental Advocacy Office (Wiener Umweltanwaltschaft) [2]. Another study dealing with the demand for bicycle parking facilities in the urban development area Seestadt Aspern was commissioned by the development agency Wien 3420 Aspern Development AG [3-5].

The starting point is an analysis of the legal framework for on- and off-street bicycle parking in Austria. Existing planning guidelines are compared with international examples from countries and cities with very high shares of cycling. Citywide data about the location of public bicycle stands are analysed. Six case study areas in the city centre, the inner city area, the suburbs and at a main railway station have been defined. Occupation rates of the bicycle stands in these areas have been counted and analysed. A web based survey has been carried out in order to gain data about bicycle parking at private locations (home, workplace). The spatial distribution of the future levels of cycling has been estimated using three different methods.

## 2 Legal framework and guidelines

On-street bicycle parking is regulated by the Austrian law in the road traffic regulations (Straßenverkehrsordnung – StVO). Bicycles have to be parked in a way that they do not topple or disturb the flowing traffic or pedestrians (StVO §68). Bicycling parking on a sidewalk is only allowed if it is at least 2.5 meters wide. Obstructively parked bicycles can be removed by the authorities without warning (StVO §89a).

The requirements for indoor bicycle parking in new buildings are regulated in the building codes of the federal provinces. The Viennese building code (Bauordnung für Wien – BO für Wien) is quite vague concerning the number and accessibility of bicycle parking facilities. Bicycle parking in staircases and other public parts of residential buildings is not allowed unless it is explicitly mentioned in the rental agreement [6]. Disregard can result in action of trespass. Reference values for the number of bicycle parking spaces for different types of buildings are defined in the Austrian guidelines and standards for traffic planning [7]. Residential buildings should provide a minimum of 1 bicycle parking space per 50 m<sup>2</sup> gross floor space, retail shops should provide a minimum of 1 bicycle parking space per 25 m<sup>2</sup> sales floor, etc. Nevertheless these guidelines concerning bicycle parking are not legally binding.

## 3 Surveys

### 3.1 Public space

In 2011 Vienna offered 3,426 public bicycle parking facilities with a total of 32,445 individual parking spaces [8]. The dominant system is the so called “Wiener Bügel” (Viennese hoop stand). Within the project ARNIKA surveys about bicycle parking in public spaces have been carried out in six different case study areas. These represent different characteristic types of built environments and land uses (Table 1).

**Table 1** Case study areas survey bicycle parking in public spaces.

Case study area	Explanation
City centre	1 <sup>st</sup> district; workplaces are dominant, important destination, roofed and non roofed facilities, time of day fluctuation
Inner city	7 <sup>th</sup> district; residential use is dominant, narrow streets, focus on parking aside official parking facilities, legally and non legally parked bicycles
Inner suburb	16 <sup>th</sup> district; historical suburbs outside the second ring (Wiener Gürtelstraße), residential use
Periphery	22 <sup>nd</sup> district; suburb north of the river Danube, metro station with bike and ride facilities
Vienna University of Technology (VUT)	4 <sup>th</sup> district; university, important destination, effect of holiday season
Western railway station	15 <sup>th</sup> district; major railway station with regional, national and international trains, bike and ride, inner city shopping centre, time of day fluctuation

The observation of the occupation of public bicycle stands leads to the following main conclusions:

- The occupancy rates of public bicycle stands vary widely (Figure 1). Sometimes facilities with very low utilisation can be found quite near to facilities with utilisation close to or even above their capacity. The most important factor explaining the acceptance of a facility is the concrete micro-accessibility. The willingness to park at a facility steeply declines with the distance from the final trip destination. This behaviour could be observed most clearly at the Western railway station. During the day the bicycle parking facility next to the platforms always ran full before the other nearby facilities were accepted. The same behaviour could be observed at the case study areas city centre, periphery and VUT.
- If no bicycle parking facility is available directly at their destination then cyclists tend to park their bicycles on the sidewalk locking them to traffic signs or other suitable items. In the case study area inner city about a third of the observed bicycles was not parked at official facilities. In total about 10% of bicycles were parked illegally on sidewalks smaller than 2.5 meters wide thus obstructing the way of pedestrians.
- Roofed facilities are more attractive than non roofed ones. During the day the roofed bicycle parking facility in the city centre always ran full before the other nearby facilities were accepted. The same behaviour was observed at the western railway station.
- Bicycle theft is an important issue in Vienna. More than 90% of the observed bicycles were locked to some fixed object, a hoop stand, a traffic sign, a fence, etc.
- The occupancy rate of public bicycle stands in residential areas tends to be significantly lower than in commercial, workplace oriented areas. For more details see also section 3.2.

### 3.2 Web based questionnaire

The purpose of the web based survey carried out in the project ARNIKA was twofold. On the one hand it was meant to collect data about bicycle parking in private spaces and on the other hand to collect data about motives and levels of satisfaction. The questionnaire was answered by a total of 342 persons. The sample is not representative, e.g. the share of academics is much higher than the Austrian average. Some of the key findings from the web based survey are:

- At home only a minority of 6% of the Viennese respondents is parking their bicycles in the street. The majority of about 28% has access to a bicycle room within the building. About 17% park their bicycles in courtyards, 15% use compartments in the cellar, 10% park (illegally) in staircases or other general parts of the building and 8% take their bicycles with them into their flat. This illustrates that aforementioned fact that public bicycle parking facilities are less important in residential than commercial and/or workplace areas. The highest

level of satisfaction was reported by the ones who can park at home in easily accessible bicycle rooms (about 85% were very satisfied or satisfied). The lowest level of satisfaction was reported by the ones who have to park on-street or in staircases (20% and 10% were very satisfied or satisfied respectively).

- At the location of the workplace a majority of about 60% reported that the bicycle is parked in the public space either at a bicycle parking facility or locked at traffic signs etc. (Figure 2). After all 10% of the Viennese respondents take their bicycle with them into their office room. Only 5% can park their bicycle in a bicycle room in the building. Again the highest level of satisfaction was reported by the ones who can park at home in easily accessible bicycle rooms (about 80% very satisfied or satisfied). The lowest level of satisfaction was reported by the ones who have to park on-street at traffic signs etc. (about 10% very satisfied or satisfied).
- The longer the duration of stay at a destination the more important is the quality and the protection against theft.
- About a fifth to a quarter of the ones who are not already cycling every day state that they would cycle more if better parking facilities would be available at home, the workplace and shops.

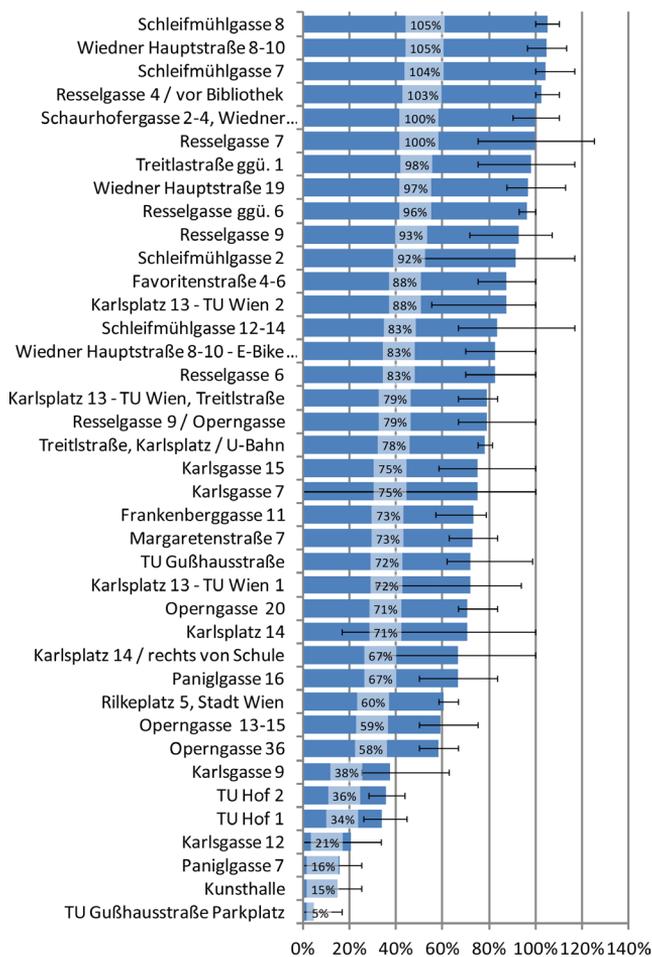


Figure 1 Average occupancy rate of bicycle parking facilities in the case study area VUT during lecture period

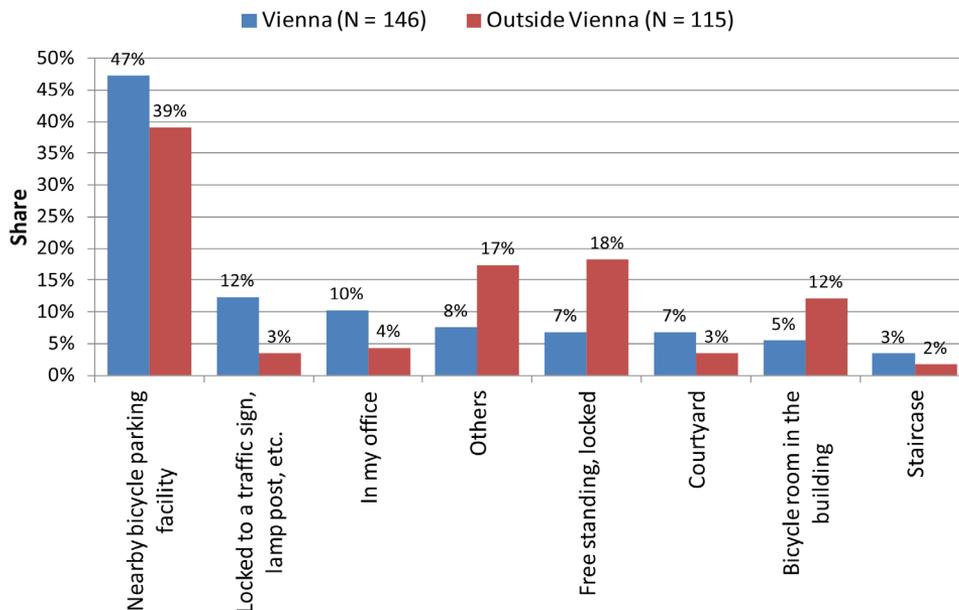


Figure 2 Type of bicycle parking at the workplace location

## 4 International examples

A literature review about bicycle parking in cities with very high shares of cycling has been carried out. All these cities experience certain levels of bicycle parking capacity problems. An important topic for cities with high shares of cycling are permanently parked, abandoned bicycles. Many of them develop information campaigns and special strategies for bicycle removal. The Swedish city of Malmö employs students for a systematic identification of problem areas. A direct comparison between the bicycle parking situation at a university in Copenhagen and at VUT was made. In the wider surroundings of the VUT buildings Karlsplatz, Freihaus and Gußhausstraße a total of 640 individual bicycle stands was counted at public facilities. All facilities are outdoors and not roofed. At the IT-University Copenhagen 565 individual bicycle stands have been counted, of which 550 are situated in the cellar of the university building while 15 are outdoors. While there are about 4 bicycle parking stands per 100 students at VUT there are about 26 bicycle parking stands per 100 students at IT-University Copenhagen.

## 5 Future demand

The attractiveness of cycling will always differ for different parts of the city. E.g. the topography of the western districts of Vienna is hillier than that of the other districts. Fitness is generally declining with old age. Hence the attractiveness of cycling also depends on the socio-demography of an area. Therefore it is unrealistic to assume that the share of cycling will ever be uniform in all parts of Vienna. Data from the census commuting statistics and household surveys have been used to estimate spatially differentiated future shares of cycling and the resulting demand for additional public bicycle parking stands. The comparison with the data about existing bicycle parking facilities results in the estimates for the future demand (Figure 3).

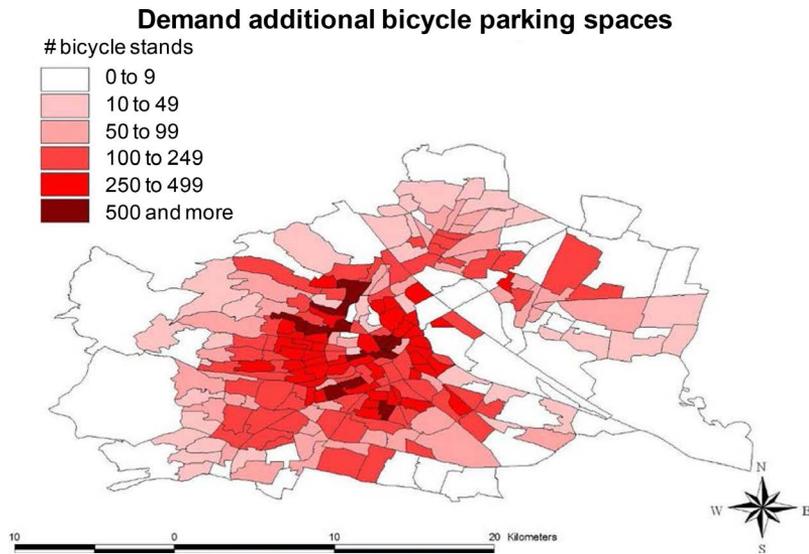


Figure 3 Future demand additional bicycle parking stands by registration district

## 6 Conclusions

According to the results of the research carried out within the project ARNIKA a total of about 44,000 to 56,000 additional public bicycle stands are needed to accommodate the intended increase to a 10% share of cycling trips. The highest demand has been identified for the central business district and the districts number 3 and 10, the lowest for the districts number 8, 6 and 5. The total investment costs have been estimated with roughly 16 million Euros. If the additional infrastructure is built in form of a five year investment program this would mean about 3 million Euros per year. The investment could be financed using revenues from car parking charges which are earmarked to be spent in the transport system. The necessary costs for the construction of public bicycle parking infrastructure would account for about 5% of the car parking charge revenues. A main result of the research presented here is that micro-accessibility is the dominant factor for the acceptance of bicycle parking facilities. Thus careful planning at the local level is essential. Hence a continuous monitoring system for public bicycle infrastructure was suggested.

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