

## **Moving in Vienna – intelligence “on the move”**

### **1. Historical Background**

Vienna, as well as the most European cities, enlarged in a radial concentric dynamic. The city shape is almost circular with two main natural borders – the river Danube in the North and the Wienerwald in the West). The first settlements in the Vienna Region date back to the late Bronze Period. The origins of the city of Vienna can be traced back to roman times, when the military camp “Vindobona” was established in the first century A.D. In its height Vindobona had about 35.000 inhabitants.

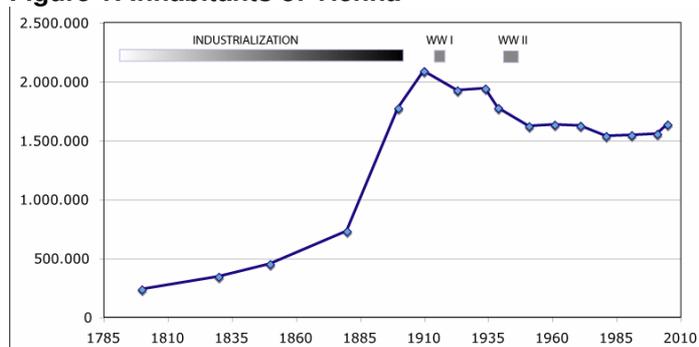
In the mid-11<sup>th</sup> century Vienna gained importance, as it rose from an insignificant border fortress to a ducal residence. The Babenbergs and the Habsburgs regarded Vienna as their hub of power. After the expulsion of the Osman Empire, Vienna was rebuilt as a baroque metropolis and imperial residence at the end of the 17<sup>th</sup> century.

In the mid of the 19<sup>th</sup> century the city of Vienna enlarged by space and doubled it's inhabitants (up to 430.000 people) through the incorporation of 34 former suburbs by a municipal charter. Furthermore the city walls were demolished in 1860 and the first big urban development project – the Ringstraße – was started. Within the Habsburg Empire Vienna gained more and more importance as well as growth, so by 1900 the metropolis had 1,6 million inhabitants and was the forth largest city in Europe. To secure and preserve the landscape in the city, the Vienna green belt was laid down in 1905.

At the end of the monarchy in 1918 the population raised up to 2,2 million. The fast growth lead to huge lack of housing beside other structural problems. However, after World War I, many inhabitants returned to their ancestral countries, resulting in a decline in the Viennese population. At the height of the immigration, about one third of the people living in Vienna were of Slavic or Hungarian descent. During the term of the so called “Red Vienna” 64.000 flats were built by the City of Vienna for 220.000 persons. Some of these municipal estates are still landmarks of Vienna's architecture like for example Karl Marx Hof or Rabenhof.

After World War II and the establishment of the Iron Curtain, with limited cultural and economical exchange to the neighbouring countries, the population decreased continuously. This trend changed with the opening up the border in 1989 and especially with the enlargement of the European Union. Nowadays the population is growing again and according to the population forecast of Statistic Austria will reach around 2,2 million again in 2075.

**Figure 1: Inhabitants of Vienna**



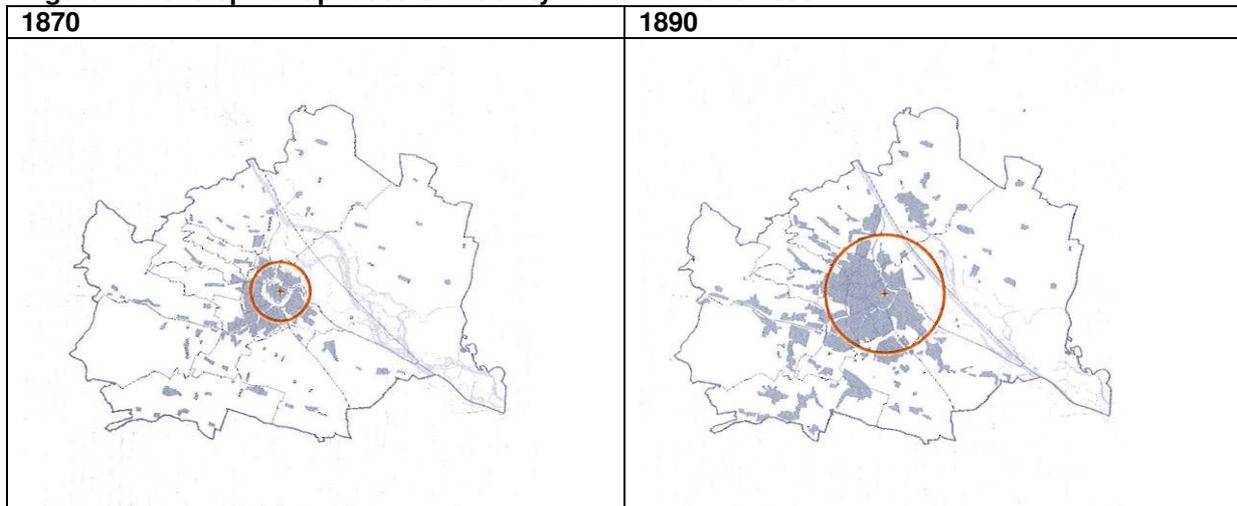
Source: ÖSTAT, <http://en.wikipedia.org/wiki/Image:Vienna-inhabitants.gif>

**Urban development and mobility**

Urban development and mobility are interlinked and affect each other not only nowadays. Also in the historic evolution of Vienna the changing use of transport played an important role. In the industrial age while walking was still the main means of transport, public transport started developing by the omnibus (horse-drawn vehicles with fixed routes, journey times and fares). As a fact of this people could reach a distance of 2,5 km in about half an hour. So from the city centre it was possible to travel almost to the second ring (Linienwall) of the city within this time. Especially the suburbs developed rapidly. More and more people started to commute between the suburbs and the city centre as well as the transport of goods increased. With further growth the city walls became a limiting factor and were demolished, as already mentioned.

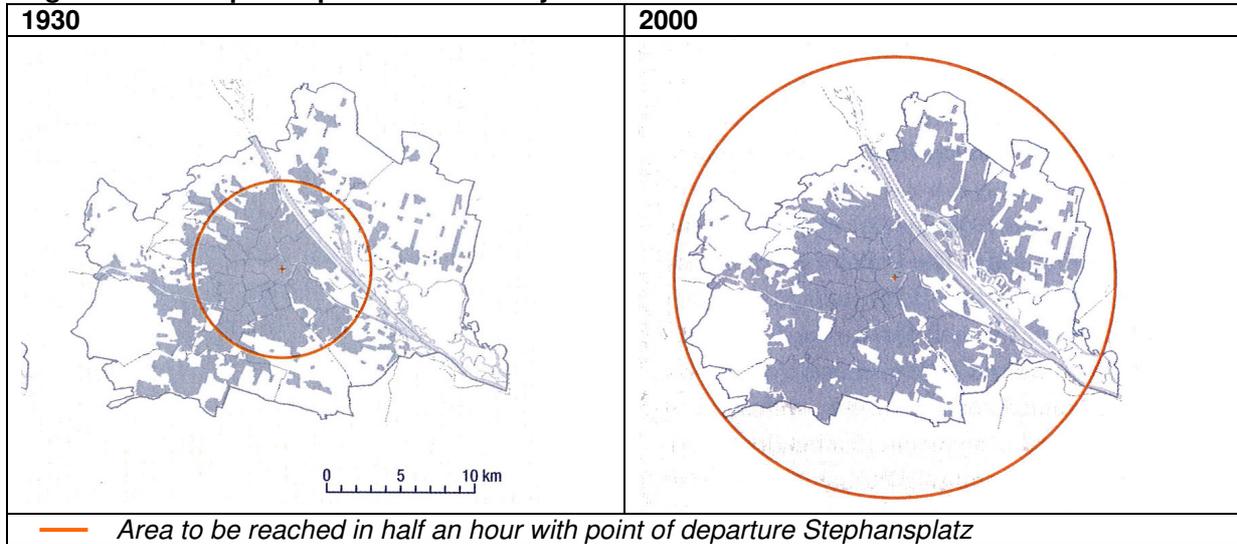
Within the next development phase from around 1870 till the turn of the century the tramway drawn by horses, became an efficient means of transport. Most of the suburbs were connected to the centre and nevertheless the city kept growing in concentric circles. The “old” omnibus network was still in use, but the tramway had much more capacity. So the half an hour radius expanded up to 4 km and included all the suburbs. The development of the railway on the one hand had no effects on inner city transportation, as a municipal railway system did not exist that time, but on the other hand lead to a further spatial division of residential and economic areas as most of the industry developed along the railway lines in the east and south.

**Figure 2: Development phases of mobility in Vienna 1870-1890**



Source: Bekesi, Sandor (2005): *Verkehr in Wien. Personenverkehr, Mobilität und städtische Umwelt 1850 bis 2000*. In: Brunner, Karl; Schneider Petra (Hrsg.): *Umwelt Stadt. Geschichte des Natur und Lebensraumes Wien*. Page 94f.

**Figure 3: Development phases of mobility in Vienna 1930-2000**



Source: Bekesi, Sandor (2005): *Verkehr in Wien. Personenverkehr, Mobilität und städtische Umwelt 1850 bis 2000*. In: Brunner, Karl; Schneider Petra (Hrsg.): *Umwelt Stadt. Geschichte des Natur und Lebensraumes Wien*. Page 94f.

At the beginning of the 20<sup>th</sup> century the electrification of the tramway led to the largest tramway network in Viennese history at the mid 20<sup>th</sup> century. The network was even enlarged to the north across the river Danube. The steam operated light railway was important for the western city development along the river Wien. The most important means of individual transport that time was the bicycle. The half an hour radius grew up to 6 km. The big municipal estates increased the density.

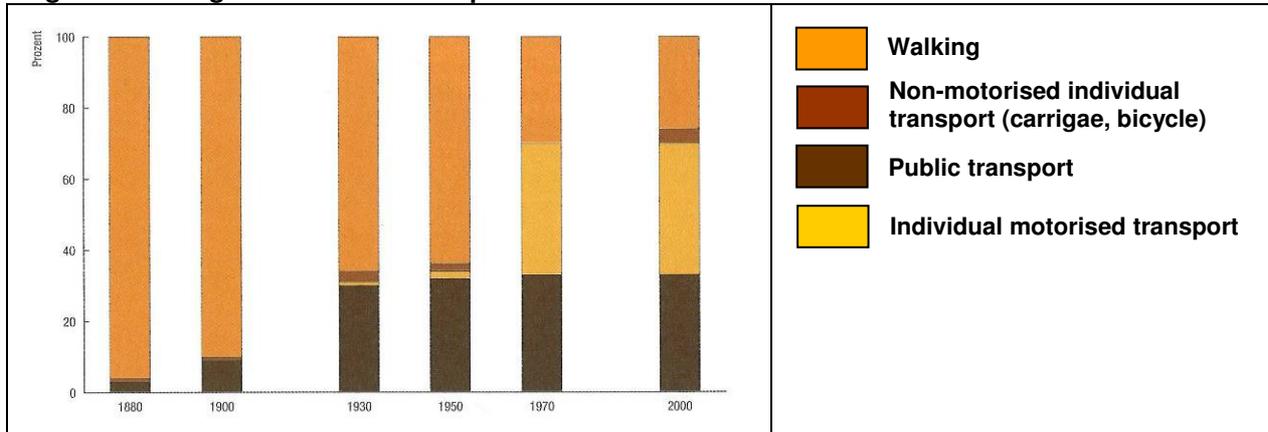
The last phase of change in the means of transport started 1960 in Vienna. The subways for the densely built-up areas as well as the municipal railway for the outskirts are the still efficient public transport systems. Due to the enlargement of the city, the public transport network got coarsely meshed on the edges.

The growing importance of the individual transport in the cities all over the world had also effects on Vienna. Pedestrian traffic lost importance and was reduced to the walk to the next public transport stop or parking lot, nevertheless in comparison to other cities in the world the Vienna's modal split is outstanding. However the trend to mono functional city development enforced by cars was also noticeable in the 1970ies. Within half an hour people nowadays travel up to 15 km – this also includes towns in the surrounding of Vienna.

**Means of transport**

In principle the denser the route network and the more frequent the connections, the more people use public transport. In Vienna nowadays no location is in more than 15 minutes walking distance form a public transport stop. Analysis show that already in 1930 one third of the modal split related to public transport in Vienna, even though it had changed dramatically in the last 120 years.

**Figure 4: Change in means of transport**



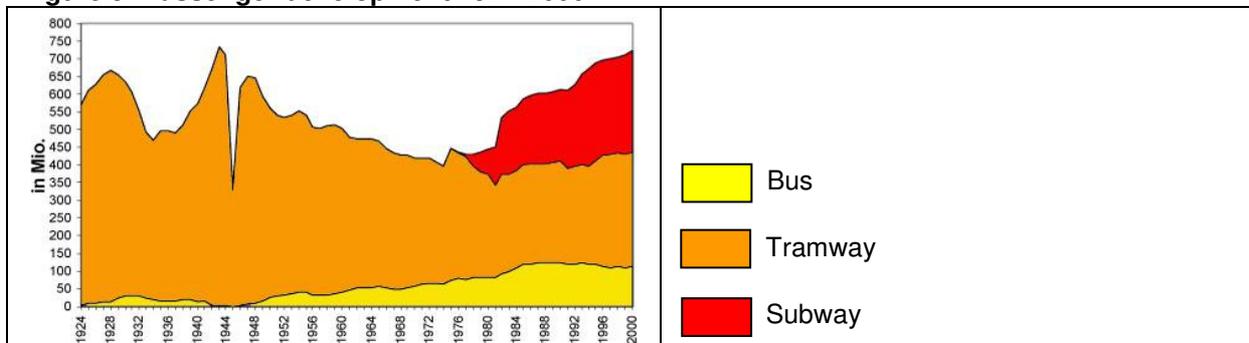
Source: Bekesi, Sandor (2005): *Verkehr in Wien. Personenverkehr, Mobilität und städtische Umwelt 1850 bis 2000*. In: Brunner, Karl; Schneider Petra (Hrsg.): *Umwelt Stadt. Geschichte des Natur und Lebensraumes Wien*. Page 95.

With 120 lines (subway, trams and buses) Vienna offers today a public transport network with over 4.500 stops on almost 1.000 km of routes. In 2006 772 million passengers used public transport in Vienna. Previously in the 1940s it was possible to transport the same amount of passengers. The public transport is operated by the Vienna Public Transport company still owned by the city and founded in the 19<sup>th</sup> century.

Already in 1929 the tramway network reached its biggest spatial extension with 106 lines and 292 km. From the mid 20<sup>th</sup> century, with growing importance of individual transport, the tramway network was and still is reduced. In former times tramlines were substituted by busses and nowadays with the extension of the subway system they are closed down as well. The construction of the first subway started in 1969 and still goes on to especially connect the edges of the city by a high-capacity public transport.

Till the beginning of the 20<sup>th</sup> century using public transport was still a luxury good. In 1967 a tariff association was establish in Vienna, which was enlarged to the “Verkehrsverbund Ost-Region” in 1984 including also the hinterland of the city. This transport policy made public transport more and more attractive for inhabitants and also commuters.

**Figure 5: Passenger development 1924-2000**



Source: Günther Grois, *Wiener Linien: Lecture: The philosophy of public transport in Vienna*. Urban Technology Network Symposium - Networking for Infrastructure Development in Central Europe. 17. - 18.5.2001, Vienna.

## **2. Traffic prevention through planning decisions**

One important aspect for the sustainable reduction of the dependency on fossil fuels is a spatial planning strategy creating long-term favourable conditions for energy-saving lifestyles and economic systems. Lifestyles and economic systems are closely linked to our types of settlements and land use. Compared with the traditional setting they are now characterized by a relaxation of ties to fixed locations. Due to development in the traffic sector goods and services can now be produced and consumed almost anywhere at any time. Traffic allows regional utilisation, which produces traffic in turn. (Bergmann et al 1993) Essential principles of a sustainable land use system are density, mixture of functions and decentralised concentration.

As already mentioned, most of the central European towns Vienna is built radial concentric as a result of the building history. Nevertheless Vienna is a polycentric city as well. The polycentric structure of Vienna includes all the former suburbs, nowadays districts, with economic, political and cultural features. All the districts act independently in certain fields, e.g. each district has its own budget. As a fact of that this small centres kept all the basic functions in an economic, political, educational and cultural sense. Related to mobility in almost every part of the city is still possible to survive without a car.

The most important building period in Vienna was the so called “Gründerzeit” (Wilhelminian style between 1848 and 1918) which is till this day formative for the townscape. In this period 70 percent of the existing buildings have been demolished and replaced by a building development with higher density. In this period also the excellent tramway network and the system of shopping streets – in Vienna the supply with goods and services can be handled by foot - were developed, which generate important quality characteristics of Vienna.

This hierarchic graded system of shopping streets and centres of the town (with the city, 23 main shopping streets and approximately 100 secondary shopping streets) is supplemented by a ring of 5-6 new main centres at the edge of the high density building areas. This development is supported by a radial subway system aiming at the city centre. This polycentric model of settlement development shall offer a “town of short ways” – a sustainable, crisis proof urban development which is independent from motorised individual traffic.

Nowadays the direction for the urban development and the development of the city’s traffic system are set by two main instruments: The Transport Master Plan Vienna 2003 and Urban Development Plan Vienna 2005.

### ***Transport Master Plan Vienna***

The Transport Master Plan Vienna - adopted by the municipal council of Vienna in autumn 2003 – sets the priorities for the future transport policy in Vienna. The master plan assumes a comprehensive understanding of mobility which also includes the spatial layout of uses as well as time relevant organisation of activities.

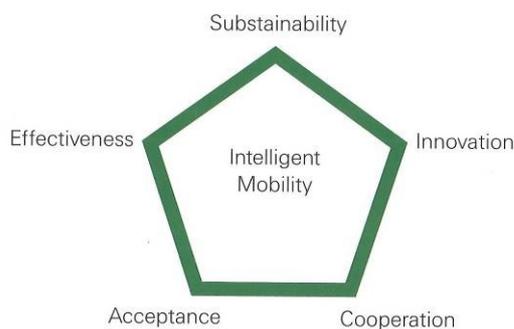
The Transport Master Plan Vienna is based on the following exemplarily picked development trends and challenges of mobility development (until the year 2013):

- The population in Vienna and especially in the city-region of Vienna will grow. (For the period of 2001-2030 a population growth of 11 % for Vienna and 17 % for the city region has been estimated. Meanwhile the population forecast assumes a population growth of 16 % for the city of Vienna between 2007 and 2030).
- Within Vienna a higher population dynamics is expected in the periphery parts.

- Alone the population growth in Vienna will generate approximately 190.000 additional journeys until 2015.
- Due to the especially high population dynamics in the hinterland a further growth of traffic extending beyond the urban boundaries is expected.

The Transport Master Plan Vienna pursues the transport policy model of “Intelligent mobility”. This intelligent mobility combines the following principles and goals: Sustainability, Innovation, Cooperation, Acceptance and Effectiveness.

**Figure 6: The pentagon of intelligent mobility**



*Source: Vienna City Administration, Municipal Department 18 (2003): Transport Master Plan Vienna 2003, Abridged Version, Page 10*

An important component to meet the goal of sustainability is traffic prevention. Traffic prevention aims at the spatial layout of uses in terms of mobility saving urban development and planning. Building on Viennas history from the Gründerzeit, as a pedestrian city for 2 million people therewith the preservation as well as the creation of mixed urban quarters and strengthening the high quality of life are pursued. Traffic prevention does not stand for limitation of mobility. It only reduced the need for mobility by maintenance and strengthening of urban densities and qualities. Thus the Transport Masterplan provides an important supplement for urban development planning. (Stadtentwicklung Wien 2003)

#### **Urban Development Plan Vienna (STEP05)**

The Urban Development Plan Vienna is an instrument used in strategic urban planning and urban development defining in general terms the further orderly expansion of the city. *“It lays down the distribution of building land and green land, and delineates development areas and defines their relationship to the overall transport infrastructure (subway, rapid transit lines, tramway lines and high-capacity railway and motorway routes).”* (Vienna City Administration, Municipal Department 18, 2005, Page 14) Additionally, it illustrates the spatial-functional relationship between the city and the region.

The STEP05 addresses urban development in regional dialogue – the functional integration of relationships of the city with the region - and pursues amongst others the goals

- to concentrate settlement development along high-capacity public transport means,
- to prudently use the resource of land,
- to encourage the vertical mix of uses and prevent functional and social segregation.

The spatial planning strategy of the city of Vienna aims at the compact city and a polycentric urban and regional structure to generally reduce the generation of traffic. People shall be enabled to manage their daily ways with little time and effort and as possible without a car. (Stadtentwicklung Wien 2005)

### ***Vienna as a compact polycentric city?***

The planning model of „compact city“ is the guiding principle for the land use and the structural development of Vienna according to the municipal department 18 – Urban Development and Urban Planning. In order to fulfil the sustainable use of land the urban planning department defines three target categories for the desired density of development in Vienna:

- Compact construction in the densely built-up urban zone (at least three to four stories) – *“in centrally located areas accessible by high-capacity public transport the targeted building density is even higher.”* (Vienna City Administration 2006, Page 014)
- Development along axes/concentrations in areas adjacent to densely built-up urban zone and accessible by high-capacity public transport with medium-scale building density.
- Sensible areas with lower density according to the location within the city and existing structures. *“This area is dominated by loosely built-up spaces, and in areas bordering the countryside features a high proportion of green space with single family homes and small plots of land with weekend chalets.”* (Vienna City Administration 2006, Page 015)

In the last decades till the fall of the Iron Curtain Vienna’s development was basically orientated towards the south and west. *“The spatial structures that grew out of the conditions prevailing in the post-war Europe and largely oriented on the West and South are being replaced by an open, permeable region in Central Europe that has economic and cultural relations in all directions.”* (Vienna City Administration, Municipal Department 18, 2005, Page 26)

Nowadays the urban development is characterised by impulses and dynamics all over the city place. Furthermore *“Vienna will continue to pursue a policy of compact structural development, and sustainable and economically viable urban expansion.”* (Vienna City Administration 2006, Page 015) The planning prerequisites for this are set as follows:

- Monitoring the growth of individual motorised traffic,
- preserving nature and valuable space on the outskirts of the city for recreational purposes,
- supporting and applying building methods that save space and energy (especially in the newly developed urban areas) and
- making city districts better accessible *“by extending the underground railway network and introducing new, modern tram lines to encourage the development of new business locations, new office centres and modern communities with mixed demographics”.* (Vienna City Administration 2006, Page 015)

### ***Location in the urban area and choice of transportation***

Naturally the choice of transportation types correlates with the location in the urban area. Differences between densely built up areas, the periphery and the hinterland are in evidence. In high density urban areas with a mixed use environmentally friendly means of transport have a considerably higher proportion of the overall traffic. Nevertheless the proportion of motorised personal transport in the periphery was reduced from 50 % to 46 % between 1993 and 2001 for the benefit of public transport.

This reduction was achieved by a mixture of measures concerning traffic policy and space structures like the consequent extension of the public transport network, parking space management and a modest expansion of the road network as well as a consistent uprating of

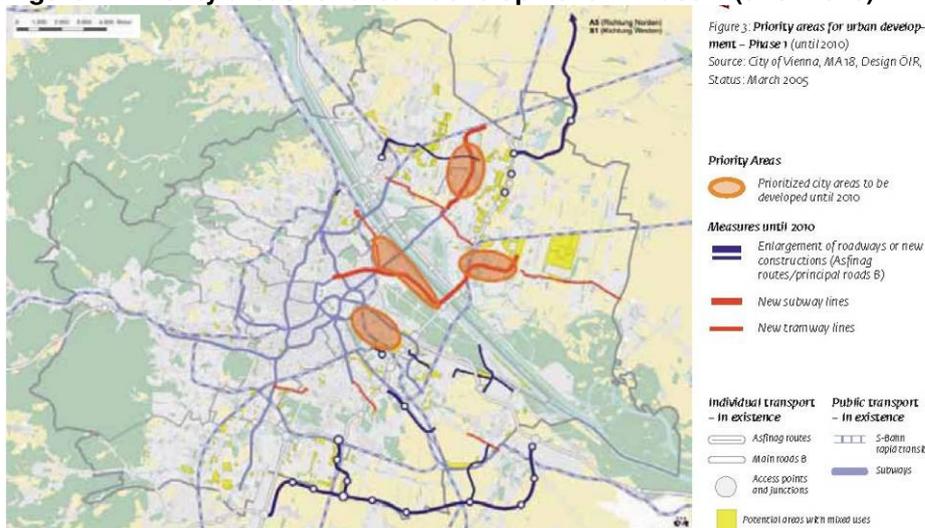
the intensity of use around underground stations. In the inner city within the Gürtel area motorised personal transport decreased by 3,7 % between 2004 and 2006. (Stadtentwicklung Wien 2003, Der Standard 23./24. Februar 2008)

**Infrastructure and location: Spatial and temporal priorities of Vienna’s urban development**

“In the next few years the planned investments in the development of infrastructure as provided for by the Transport Master Plan will improve the accessibility of locations and thus their attractiveness.” (Vienna City Administration, Municipal Department 18, 2005, Page 57). Based on this infrastructure planning and in line with the objectives of the compact city and the sustainable urban development the Urban Development Plan has defined spatial and temporal priorities for the settlement development of Vienna in the future. Based on the period for the realisation given in the infrastructure planning two phases for the development of the urban area are defined:

- Phase 1 until 2010 includes the locations made accessible by the extension of the subway line in the 2nd district, where also the stadium for European soccer championship 2008 is located which is easily accessible by high speed public transport. Furthermore the high potential of the area Erdberger Mais, the local area Stadlau-Mühlgrund and the areas between Zentrum Kagran and Großfeldsiedlung-Brachmühle are targeted for development.

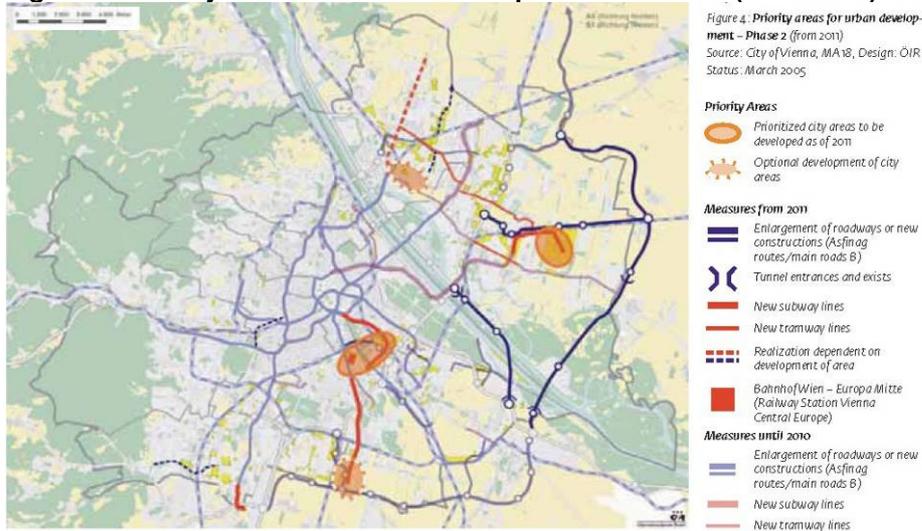
**Figure 7: Priority areas for urban development – Phase 1 (until 2010)**



Source: Vienna City Administration, Municipal Department 18 (2005): Urban Development Plan Vienna, Short Report, Page 53

- In Phase 2 starting in the year 2011, the focus of urban development will gradually shift to the areas of Hausfeld-Flugfeld-Aspern and the construction of the Vienna Central Train Station as well as the development of a new city district in the area of the former Vienna South/East Train Station. (Stadtentwicklung Wien 2005)

**Figure 8: Priority areas for urban development – Phase 2 (from 2011)**

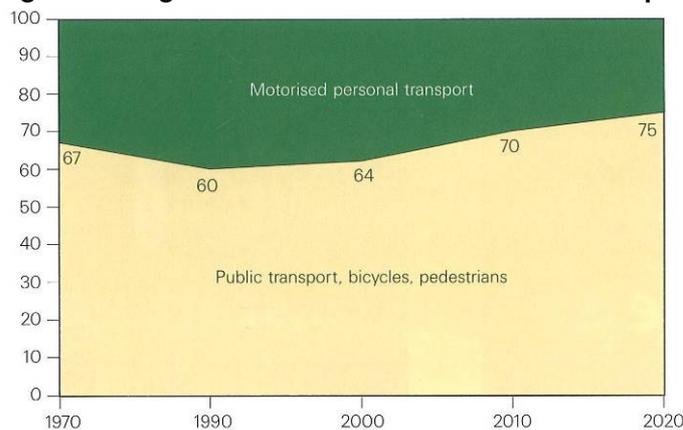


Source: Vienna City Administration, Municipal Department 18 (2005): Urban Development Plan Vienna, Short Report, Page 53

**Traffic shift to environmentally-friendly traffic**

Another main objective is the increase of the proportion of environmentally-friendly transport (bicycle, pedestrians, public transport) to the total traffic performance. The proportion of the individual motorised traffic shall be reduced from 35 % to 25 % until the year 2020. Since the end of the year 2006 the use of public transport (35 %) exceeds the use of motorised personal transport (34 %). (Stadtentwicklung Wien 2003, Der Standard 23./24. Februar 2008)

**Figure 9: Targets for distribution of modes of transport used by the Viennese (every day)**



Source: Vienna City Administration, Municipal Department 18 (2003): Transport Master Plan Vienna 2003, Abridged Version, Page 11

Vienna has an extensive tram and bus network - the tram network being third largest in the world. In the most populated areas of Vienna, transportation systems are run so frequently (even during off-peak hours), that any familiarity with departure timetables is virtually unnecessary. The convenience and flexibility of the public transport is therefore reflected through its popularity.

In addition to the massive expansion of the subway and tram network (in the year 2009 the Vienna subway network includes approximately 75 km and 100 stations) measures to speed

up and prioritise the public transport as well as the upgrading of the comfort act to increase the attractiveness of public transport.

In the year 2006 the net of cycle-tracks covers approximately 1.000 km. This means that the cycle network was doubled since 1992. The proportion of cyclists of the overall traffic volume in Vienna ranges – depending on season and location in the urban area – from 2,5% to 8%. At several sections of the net as for example at the Mariahilferstraße the proportion of cycle transport already reaches 20%.

In the city center the share of cyclist as well as pedestrians is the highest in comparison with the other districts. In 2005 for the first time one million cyclists were recorded at the Opernring. Until 2020 the proportion of cyclist on the overall traffic shall be raised to 8%.

With this Vienna is still far away from other Austrian cities like for example Salzburg with 16%. Even though small and medium towns like Salzburg have a structural advantage over bigger cities and in Vienna cycling is competing against public transport – which is with 35% very high in international comparison, there is still a lot of potential for cycling in Vienna. (Stadtentwicklung Wien 2008)

To stabilise pedestrian traffic at the present high level a comprehensive interconnecting pedestrian network should be created taking into account the pedestrian-based economy. Structural measures for the safety of crossings, opening-up of gaps, pedestrian-friendly circuits of traffic lights, unrestricted passage of different levels and a minimum pavement width of 2.00 meters are examples to improve quality of life for pedestrians and increase their road safety. (Stadtentwicklung Wien 2003, Fohler-Norek 2006)

### ***Increase the efficiency of vehicles***

The efficiency of vehicles has increased in the last years. Nevertheless all in all the CO<sub>2</sub> impact anyhow increased furthermore due to rise of the average power of the vehicles. In the city of Vienna efforts are being made to enhance efficiency. Routes are optimised and all railcars built as of the 90ies have a 30 % energetic recovery system of the braking energy. (Fohler-Norek 2006)

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