DT.1.2.8
ACCESSIBILITY TO VIENNA AIRPORT FUA

Analysis of the mulimodal mobility system in the Vienna Airport FUA

Version 1

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OTHER LOGO

Based on the methodology DT.1.2.1 we suggest a structure for table of contents ensuring comparable reports in each FUA - feel free to adjust to your need as well.

Use also tables and graphics and pictures to illustrate the topic.

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1. Introduction

The Airport of Vienna handles around 23 million passengers a year and is the biggest airport in Austria. Due to its proximity to Eastern Europe the actual catchment area expands across the national borders to the Czech Republic, Slovakia, Hungary and Slovenia. The Airport of Vienna is an important economic driver for the region; employees come from all across the functional urban area (FUA) of Vienna which includes three provinces, Burgenland, Lower Austria and Vienna. The airport is well connected to its FUA by rail as well as by road. Even a bicycle path is available between the City of Vienna and the airport. The transport network is served by various modes with different service qualities. Local, regional and long-distance trains connect the airport in high frequency during peak hours. On-demand mobility services such as car-sharing, busses, on-call shuttles and cab services increase the diversity of supply. Furthermore, the airport has lot of parking capacities for those arriving by private car. Mobility information systems about all these existing mobility options do exist but only include information to a certain grade.

2. Airport Vienna and functional urban area (FUA)

2.1. General description

The Vienna international airport is located 20 kilometres of the City of Vienna in the province of Lower Austria. The immediate surrounding of the Vienna Airport region is characterized by agricultural areas, small- to medium-sized villages and industries (e.g. Austrian Mineral Oil Administration). The city of Vienna is the largest city within the airport's catchment area with approximately 1.8 Mio inhabitants. The Vienna Airport can be described as a key east-west hub and also services neighbouring capital cities such as Bratislava and Budapest.

Functional urban areas (FUAs) were originally defined for making different metropolitan areas comparable when it comes to their economic, social and environmental performances.[1] Therefore, this term is used for comparing different airport areas and its FUAs with each other in the LAirA project.The FUA of Vienna based on the OECD definition comprises 313 municipalities in Austria.[2] Although Linz and Graz are accessible within approximately two hours as well (and therefore part of the catchment area) from the Vienna Airport, these two cities are not considered for this study. Linz and Graz are served by other regional airports which belong to other Functional Urban Areas (FUA AT003 for Linz and FUA AT002 for Graz).

The total population of the Vienna FUA were 2,793,631 inhabitants in 2014.[3] The City of Vienna has about 1.8 million inhabitants by 2017. As shown in Figure 1, the functional urban area of Vienna includes the city core as well as its commuting zones, where the airport of Vienna is located as well.

[1] OECD 2017a online

[2] OECD 2016b

[3] OECD, 2017b online

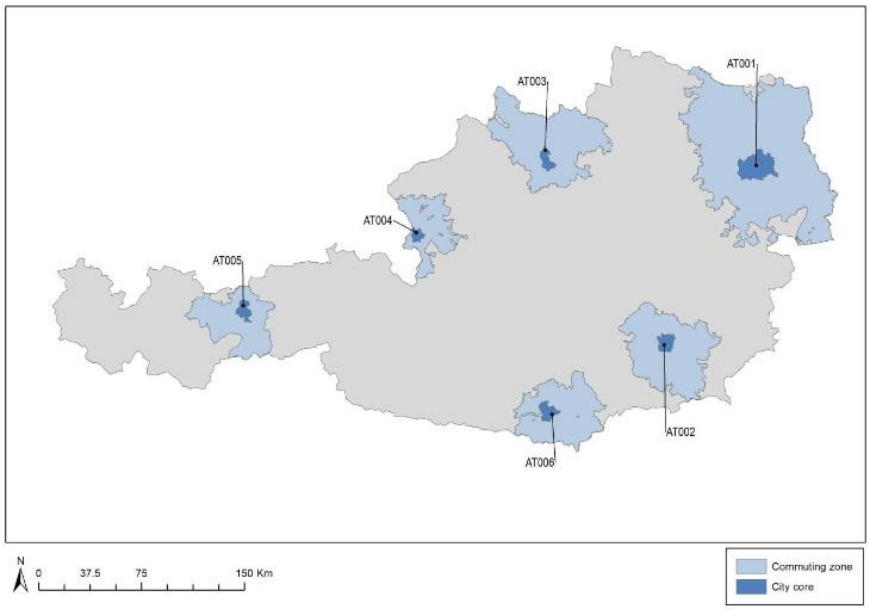

Figure 1: Functional Urban Areas (FUA) in Austria
(Source: OECD 2016a, p.1)

At this point it is important to notice that a difference between the accessibility for passengers and employees has to be considered. According to the Vienna Airport, the catchment area covers parts of Austria, the Czech Republic, Slovakia, Hungary and Slovenia within a time window of two hours.[4] As shown in Figure 2, also parts of Germany and even the capital cities Bratislava and Budapest are accessible within 60 - 180 minutes by car. The catchment area is mainly relevant for passengers departing from or arriving at the Vienna Airport. Nevertheless, LAirA will concentrate on the airport's FUA which will allow to address all employees and a large share of the passengers.

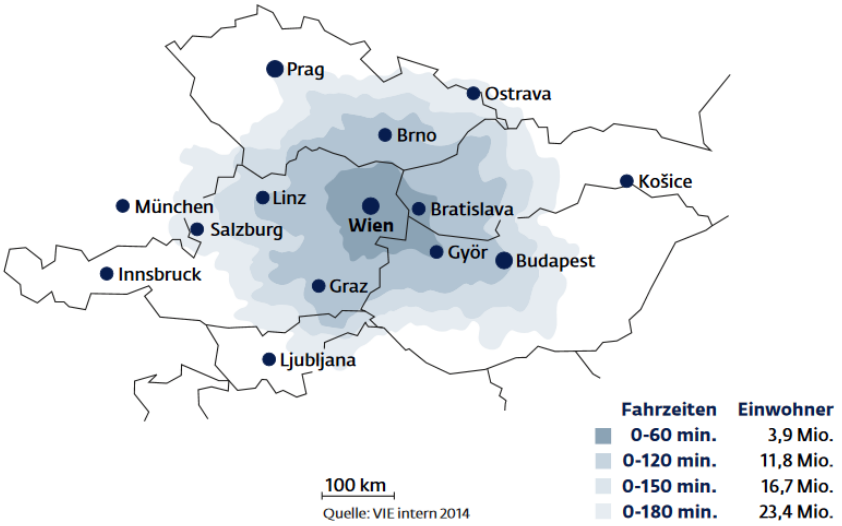

Figure 2: Catchment area of the Vienna Airport
(Source: Flughafen Wien AG 2017, p.14)

[4] Flughafen Wien AG 2017, p.14

2.2. Airport facts and figures

The Vienna International Airport spreads out over an area of 10 square kilometres. At the moment the airport has two runways, 99 parking positions including 37 docking positions for airplanes, about 61 shops and 31 restaurants in a total area of 19,000 m^2.[5] In 2014 around 20,000 people were employed in the area of the airport. The Vienna International Airport itself employed 4,322 people by the end of 2016, of which 11.7% were women.[6]

In 2016 the Vienna International Airport had a turnover of 741.6 Mio Euros, of which the biggest share with 370.8 Mio Euros was due to the airport segment.[7] The segment 'airport' includes the operation and maintenance of all operating areas, passenger and luggage handling as well as the security checks for passengers and luggage. At the moment the Vienna Airport can handle 36 Mio passengers per year and 72 aircraft movements per hour.[8] Currently the airport has two runways for landings and take-offs and a third runway is scheduled to be built. However, in April 2017, the Federal Administrative Court in Austria came to the decision to inhibit the construction due to environmental- and soil-related issues. In August 2017 the legitimacy of this decision was repealed by the Administrative Court due to lack of balancing of interest. The Vienna International Airport and the province of Lower Austria are strongly interested in the construction of the third runway, since calculations show that the airport would not be able to handle its passenger demand by 2020 without the expansion. Furthermore, both parties are of the opinion that the economic situation will be weakened if the third runway cannot be built.

In 2016 a total of 23,352,016 passengers were counted at the Vienna International Airport[9] and 72 airlines were operating at the Vienna Airport[10]. Figure 3 shows the passenger share per airline. Transport demand models estimated that by 2020 the passenger demand will increase to 32 Mio passengers per year. This is also relevant for the landside accessibility of the airport and the dimension and characteristics of the transport system.

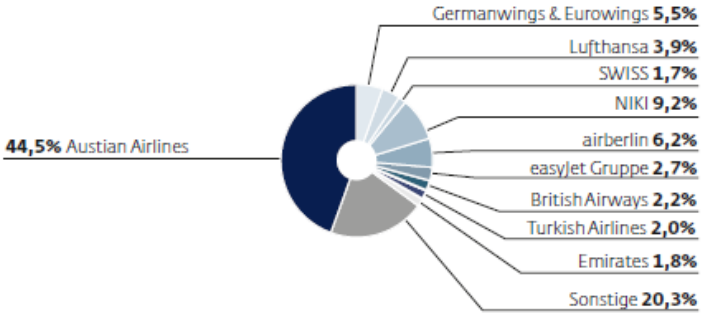

Figure 3: Passenger share per airline in 2016 at the Vienna Airport (Source: Flughafen Wien AG 2017, p.25)

2.3. Facts on environmental and social engagement

The Vienna Airport is actively engaged in different environmental protection initiatives. Based on a carbon footprint evaluation from 2013, a carbon dioxide reduction programme was set up. The carbon footprint

[5] Flughafen Wien AG, 2017
[6] Flughafen Wien AG, 2017, p.4
[7] Flughafen Wien AG, 2017, p.3
[8] Flughafen Wien AG, 2017, p.14
[9] Flughafen Wien AG, 2017, p.15
[10] Flughafen Wien AG, 2017, p.25

evaluation took into account all potential sources within the airport area such as air traffic, aircraft handling or landside traffic. Results show that 76% of all carbon dioxide emissions were produced by the air traffic. Nonetheless, the Vienna International Airport also launched activities in order to minimize greenhouse gas emissions when accessing and leaving the airport at landside. A project for optimizing the local public transport supply was implemented. A mobility survey was conducted at the airport as well as in 27 municipalities adjoining the airport. On the basis of this survey, a regional mobility concept was drafted.[11] Furthermore, a ride-sharing initiative was launched. Mobility-related aspects regarding the landside accessibility of the airport will be described in this report at a later stage and differentiated by mode.

The Vienna international airport is part of the Airport Carbon Accreditation System (ACAS) which is managed by Airport Council International (ACI) Europe.[12] The ACAS is a programme to support and encourage airports to reduce carbon emissions from their operations with the long-term goal of becoming carbon neutral. Airports such as the Vienna Airport have to apply independently and have to get their activities verified in accordance with the ISO14064 (Greenhouse Gas Accounting).[13]

The Airport Carbon Accreditation has 4 levels of certification (mapping, reduction, optimisation and neutrality) and the Vienna Airport has already reached level 3 ("optimisation by third party engagement in carbon footprint reduction") in 2016.[14]

Furthermore, the Vienna International Airport's vehicle fleet is gradually being converted into environmental friendly neutral gas and has already the largest fleet of this type in Austria. The gas filling stations are also available for vehicles operating outside of the airport.[15]

Measurements on the pollutions being generated at the airport are managed by the Lower Austria provincial government and can be retrieved on the "Niederösterreichisches Umwelt-Beobachtungs-Informations-System (Numbis)" website.[16]

In 2014 a sustainability report of the airport was published where certain measures were defined to be considered by the company's sustainability management. Within this report a matrix shows the grade of importance of different fields of action for its stakeholders as well as the Vienna Airport. Of course, the areas of mobility and transport are of high importance for both, the company itself and its stakeholders.

Based on the described matrix the airport has defined goals and areas of activity for providing socially, economically and ecologically sustainable developments. One major goal is to ensure a good relationship to its immediate neighbours and achieving a common understanding of future developments.[17]

Already in 1989 a neighbourhood advisory board was implemented for enabling a constant dialogue between the airport and the neighbouring municipalities. The advisory board meets four times a year and participants are the chairman of the Vienna International Airport and the mayors from the municipalities of Schwechat, Fischamend, Klein-Neusiedl, Enzersdorf a. d. Fischa, Schwadorf, Großenzersdorf, Rauchenwarth, Zwölfaxing and Himberg as well as the district leaders of the bordering Viennese districts Simmering and Donaustadt.

Between the years of 2000 and 2005 the most comprehensive mediation procedure within Europe took place around the Vienna Airport. Results of the mediation process were a civilly binding mediation

[11] Flughafen Wien AG, 2017, p.40
[12] Flughafen Wien AG, 2017a online
[13] ACI EUROPE, 2017 online
[14] Flughafen Wien AG, 2017a online
[15] Flughafen Wien AG, 2017a online
[16] Flughafen Wien AG, 2017a online
[17] Flughafen Wien AG, 2017, p.25

contract, the implementation of a constant dialogue forum (see www.dialogforum.at) for communication purposes as well as the environmental fund ("Umweltfonds"). Main goal of these measurements is the enhancement of the living quality of people living in the surrounding area of the airport who are affected by noise and pollutant emissions.

3. Characterisation of the mobility system

After providing a general overview on the airport of Vienna and its activities towards green developments the following chapter will examine characteristics of the mobility system in which the Vienna International Airport is embedded. The description includes the existing modes of transport (infrastructure and vehicle related) and if considered as relevant in the LAirA context, detailed information on available mobility and transport-related information services for employees and passengers.

3.1. Airport access to Vienna and the FUA

The airport is located approximately 20 kilometres east from the city centre of Vienna in the municipality of Schwechat which belongs to the province of Lower Austria. The airport is very well connected to its surrounding area by road and railway with access for individual cars, busses, and car rental services, taxis, local and long-distance trains. Furthermore, active mobility options such as bicycle paths are available for reaching the airport area from Vienna as well as from municipalities in the immediate area. Accessibility (in the context of transport) is defined by the mobility options that are available at a specific location at a certain time.[18] Therefore, available mobility options and services are qualitatively described for the Vienna FUA. Figure 4 illustrates the accessibility of the airport form the centre of the City of Vienna.

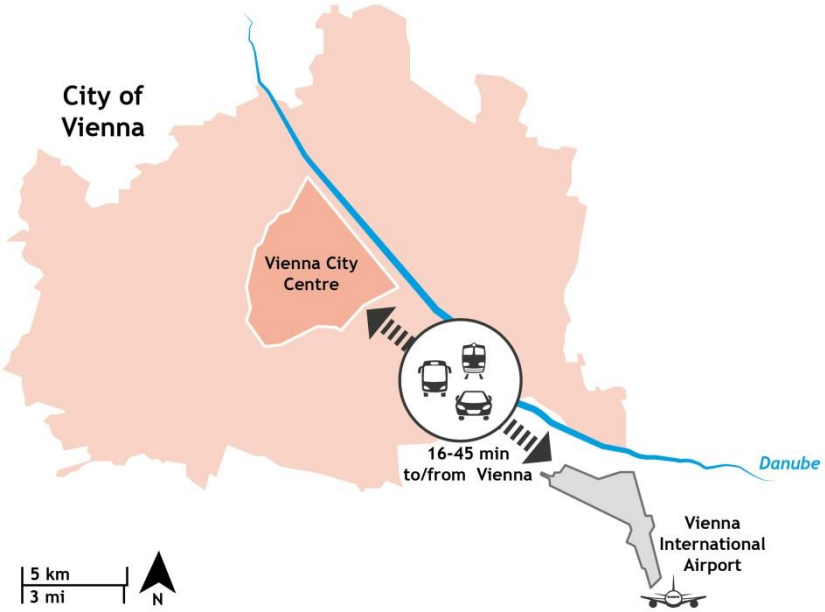

Figure 4: Schematic diagram showing accessibility of airport from Vienna City Centre

[18] Cerwenka et al., 2007, p.5

Not just from the city centre but from all parts of the FUA it is possible to access the airport by road and rail with different modes of transport and types of vehicles such as private cars, shared cars, busses, bicycles, cabs or local and long-distance trains. Figure 5 shows existing mobility services to the City of Vienna as well as to other parts of the FUA. The figure includes services that are directly connected respectively related to the airport. Of course, also private cars can reach the airport via the highway "A4" or the federal road "B9" but are not explicitly shown in the graphic.

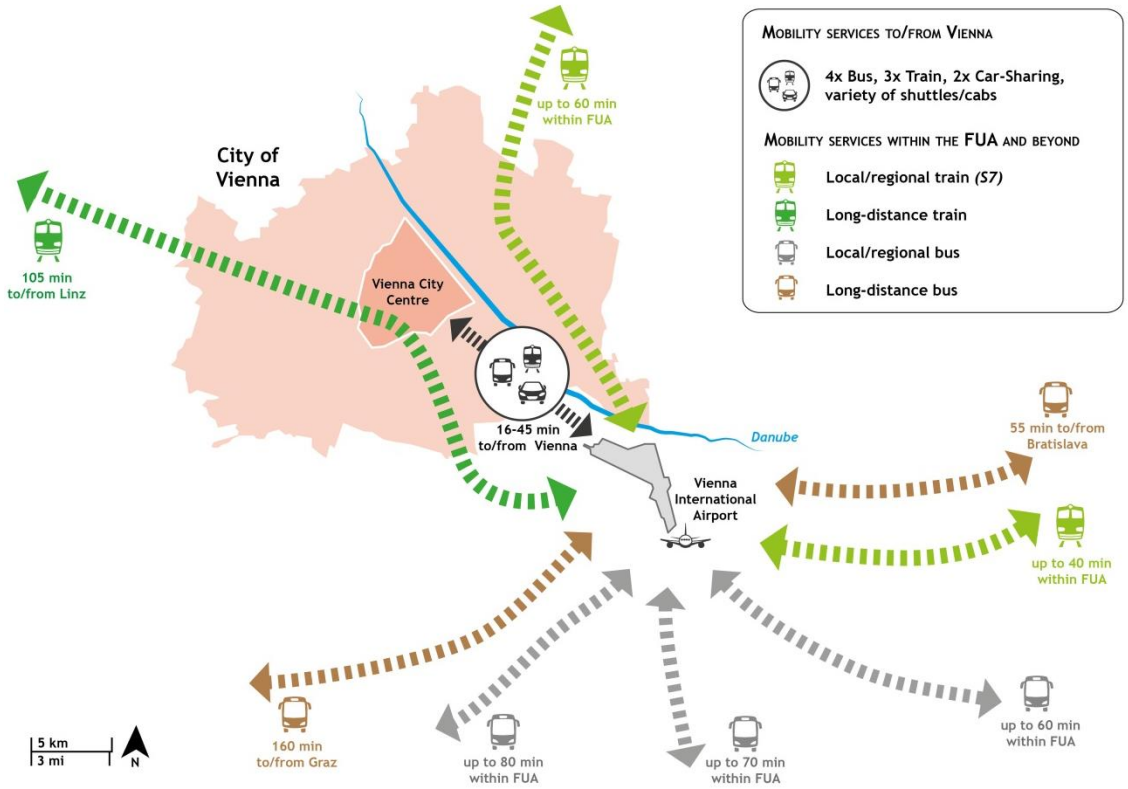

Figure 5: Schematic diagram with direct mobility services to/from the Vienna FUA

Time indications that are mentioned for public transport modes in Figure 5 belong to one whole trip from the airport until the final destination. Of course, there are other stops on these courses serving municipalities across the FUA. The following chapters provide a detailed description of the mobility system respectively network and its services.

3.1.1. Characterisation of road network and services

The airport and its FUA are connected via the motorway "A4" as well as the federal road "B9". The city centre of Vienna is reachable within 15-20 Minutes by car in case of normal traffic volume. At peak times and depending on construction sites along the motorway (which are not unusual), a longer travel time must be assumed. The motorway A4 is well connected to the higher-raking transport network and therefore the airport is also very attractive for passengers coming from the Czech Republic, Hungary and Slovakia.

On a smaller scale the airport can easily be reached from its immediate surrounding municipalities by country roads and another highway called "S1" which also connects the airport area with the southern and western part of Austria. However, there is an interchange between the S1 and the A4 which means, the S1 does not directly access the airport. Considering these road-side connections it is obvious that the

catchment area of the Vienna international airport is fairly extended across the Austrian borders. Via road, private cars, taxis, car rental services and busses can access the airport.

The Vienna International Airport is serviced by four bus lines (Vienna Airport Line 1-3, AirLiner) directly connecting it with the City of Vienna. The intervals of the busses vary depending on the day of the week and time of the day. The AirLiner, for example, runs daily between 5am and 10pm 14 times per day (every 60 minutes) for a price of €5 for a single ticket and €9 for a return ticket.[19]

Another provider, the Vienna Airport Lines (VAL) operates with three different bus lines (VAL1, VAL2, VAL3) between the airport and different stations in the western ("Wien Westbahnhof"), northern ("Donauzentrum") and central ("Wien Schwedenplatz") part of Vienna. The operating hours and frequency of the three VAL bus lines again vary from the day of the week and the time of the day. E.g. the busses VAL1 and VAL3 run between 5:15am respectively 5:58am and 11:40pm respectively 6:58pm every 60 minutes, whereas the bus line VAL2 operates daily between 4:30am ad 11.30pm every 60 minutes and irregularly between 11.30pm and 4.30am. Rides with the Vienna Airport Lines cost €8 for a single and €13 for a return ride.[20]

The bus lines 221, 222 and 273 operate between the airport and surrounding municipalities and cater for mobility needs of the employees at the airport and citizens within the catchment area. The lines 222 and 273 are connected to train stations of the regional railway network, i.e. the stations of Fischamend, Gramatneusiedl and Ebreichsdorf. However, the intervals of these regional and local bus lines, operated by ÖBB-Postbus AG, operate at a lower frequency and one ride between the origin and destination station (in all cases the connected railway station) takes at least an hour. The intervals vary between 30 and 350 minutes depending on the day of the week and time of day.[21]

On the airport site an "Airport Shuttle" operates between the on-site companies and airport-related infrastructure (e.g. terminals, parking lots, train station). The airport shuttle operates in a defined course starting at 5:30 am and ending at 11:30 pm. Between 5.30 and 8:30 am and 2 pm and 4 pm the bus line serves the stations every 15 minutes, between 8:30 am and 2 pm and between 4 pm and 11:30 pm stations get served every 30 minutes. During nights, meaning the time window between midnight and 5:20 am, the bus operates every 20 minutes.[22] Prices vary depending on the type of ticket, starting at € 0.75 for a single ride up to € 200 for a full year.[23]

Besides the local and airport-specific bus lines, also long-distance busses are connected with the Vienna Airport. Companies such as Postbus, Flixbus, Regiojet, Eurobus and Leo Express connect the airport with cities in Slovakia (Bratislava, Prešov, Košice), Hungary (Budapest, Györ), the Czech Republic (Brno, Znojmo, Prag), Poland (Wroclaw), Romania (Miercurea Ciuc, Sibiu, Timisoara) and Slovenia (Ljubljana).[24] The busses connecting the Vienna Airport to its FUA directly stop at the terminal buildings and enable a seamless connection to the airside transportation.

However, a lot of space at the Vienna Airport area is reserved for short-term and long-term car parking options. In total 11,038 covered parking spaces are available and 10,214 spaces are available outdoor.[25] Two covered parking areas and three short-term parking lots area located next to the terminal buildings and two more (long-term) parking lots are situated in the outer area of the Vienna Airport. It is also possible to book a parking space online in advance. Depending on the walking distance from the parking

[19] Blaguss Reisen GmbH, 2017.
[20] ÖBB-Postbus GmbH, 2017 online
[21] Flughafen Wien AG, 2017b online
[22] Flughafen Wien AG, 2017c online
[23] Flughafen Wien AG, 2017d online
[24] Flughafen Wien AG, 2017b online
[25] Flughafen Wien AG, 2017, p.15

lot to the terminal buildings prices vary for e.g. two days of parking between €79.90 (closer parking lots) and €44.90.[26] On the website of the Vienna Airport individual fares can be calculated.

Two charging stations for electric vehicles are available at the airport. Charging stations are available in the parking lot "4" as well as on the parking space "C", both served by "TANKE Wien Energie". Due to their locations it can be assumed that one is mainly addressing passengers and the other one addressing employees.[27] For using the charging stations at parking lot 4 and parking space C a specific member card is needed in advance. Another high-speed e-charging station located at the parking lot of the grocery store "BILLA" which is located in direction of the highway and easily accessible by car.[28] The charging station at the BILLA parking lot is operated by the company SMATRICS. For using the SMATRICS charging station, also a specific member card and/or a user account is needed in order to commence and pay the charging process.[29]

3.1.2. Characterisation of rail network and services

The Vienna international airport is connected to the regional and the long-distance railway network. The railway network (considering the airport connection) is served by trains from the Austrian Federal Railways Association ("Österreichische Bundesbahnen - ÖBB") and the City Airport Train (CAT) which operates independently but is owned by the Vienna International Airport (share of 50,1%) and the ÖBB (49,9%).

The CAT serves the route between the City Centre of Vienna ("Wien Mitte") and the airport and operates daily between 5:36 am (from the city centre) and 11:39 pm (from the airport) every 30 minutes. One journey between the city centre and the airport takes 16 minutes and costs €11 one-way and €19 return. Airport employees are able to use the CAT for free for travels to and from work.

Another train connection between Vienna (and beyond its immediate borders) and the airport is serviced by the suburban train line S7, a so-called "S-Bahn", operating daily between 4am and 10pm in an interval of 30-60 minutes. The line S7 connects the district of Mistelbach, located in Lower Austria, northern of Vienna and close to the Czech border, with the airport. Furthermore, the line S7 closes the gap between the region "Bruck an der Leitha" which is also located in Lower Austria but east of Vienna and close to the Slovakian border. The journey from both directions to the airport takes around 45-60 minutes. The S7 enables interchanges with various underground stations in Vienna as well as busses and other suburban train lines. The regular fare for one ride between the city centre of Vienna and the airport is €3.90 (e.g. owners of a railway-related bonus card pay €1.20 for the same ride) and takes approximately 23 minutes.

The ÖBB operates long-distance trains that connect the airport with St.Pölten (the capital city of Lower Austria), Linz (the capital city of Upper Austria), Salzburg, Innsbruck (the capital city of Tyrol), Graz (the capital city of Styria) and Klagenfurt (the capital city of Carinthia) as well as Brno, Prague (both Czech Republic) and Györ and Budapest (both Hungary). With these long-distance connections the airport enhanced its importance as an Eastern-European hub.

Another project that is yet not implemented nor planned in detail is the so-called "Flughafenspange" which is a rail-interlink between the S7 (from the train station of the Airport of Vienna) and the "Ostbahn" (the eastern railway-link connecting Vienna with Hungary). By June 2017 the strategic impact assessment

[26] Flughafen Wien AG, 2016 online

[27] Flughafen Wien AG, 2017e online

[28] SMATRICS GmbH & Co KG, 2016 online

[29] SMATRICS GmbH & Co KG, 2017 online

for the planned infrastructure project was completed and the proposed railway path was approved for possibly being used as high-performance railway track.[30]

3.1.3. Characterisation of cycling network and services

The cycling path connecting the Vienna Airport with the city centre of Vienna and immediate municipalities and villages was implemented recently. . The travel time for cycling from the city centre of Vienna (Wien-Mitte/Landstraße) to the airport takes around 75 minutes for a distance of 18 kilometres – assuming good/acceptable weather conditions (see Figure 6).

Figure 6: Biking infrastructure between the city centre and the airport of Vienna (Source: VOR GmbH, 2017)

A company called "nextbike"[31] provides shared bikes in Austrian regions which are also available in many locations in Lower Austria, even at the airport. One station is situated in the Handling Centre West (next to the Airport Cargo Centre) and the other one is situated in the Office Park 1, both addressing potential mobility needs of employees working at the airport. "Nextbikes" can be used either with a smartphone app or by calling a hotline. Bikes can be rented at one location and returned at another. The billing system is based on the time of usage of a bike. At the parking space C charging boxes for e-bikes and e-scooters are installed and can be used with a charge card for "Wien Energie" charging points, as described in chapter 3.1.1.

3.2. On-demand mobility services

In addition to regular (public transport) services, on-demand mobility services such as taxis or car-/ride-sharing initiatives are offered at the airport of Vienna. Car-/ride-sharing can be distinguished by their private or commercial character. Commercial car-sharing initiatives are provided by two profit-oriented companies operating in and around Vienna: "car2go" by Daimler and "DriveNow" by BMW. Besides these commercial car-/ride-sharing options also privately organised ride-shares are promoted and supported by

[30] bmvit, 2017

[31] nextbike GmbH, 2017 online

the Vienna Airport and other companies (e.g. Austrian Airlines) located at the airport's area. In addition to usual cab services other on-demand shuttle busses operate between the airport and its FUA.

3.2.1. Car-sharing

As already mentioned, two different car-sharing companies serve the Vienna International Airport, namely car2go and DriveNow. However, these offers solely are provided between the operating area of Vienna and the airport area (specifically, certain parking spaces). Both pick-up/drop-off stations are located in a car park next to Terminal 3 and reachable by a weatherproof connecting passage from the main terminal buildings.

Using a car2go to and from the airport requires an additional fee of €12. It is possible to reserve an available car2go 30 minutes in advance. In case no car is available at the requested time, so-called "radar" can be activated which the user via push-notifications about the availability. Speaking in use cases this would mean a person could hop into a car2go in the City of Vienna and drop it off at a certain parking space at the airport with an additional fee. However, for using a car2go, users have to be registered and validated in advance. Car2go users that registered their account in another country are able to reserve a car in Austria as well.[32]

DriveNow provides BMW or MINI cars for driving to or from the Vienna Airport. An additional fee of €10 is required for parking the DriveNow car at the airport, although this fee is 50 % lower on Tuesdays and Wednesdays. It is also possible to reserve a car for free 15 minutes in advance.

Both car-sharing options show similar characteristics and enable (domestic) flight passengers (employees would not use it regularly due to economic reasons) to take a car instead of public transport respectively saving parking fees (compared to using their own car). Also the fact that hardly any information about these mobility offers is available in English shows that they do not seem to address international passengers.

3.2.2. Ride-sharing

The Vienna International Airport together with Austrian Airlines, Gebrüder Heinemann, Celebi and NIKI Luftverkehr launched the online ridesharing-network "Drive2VIE", hosted by the German company "flinc". The intention was to create a company respectively location specific network for quickly matching requested and available rides from or to the airport of Vienna. The principle is easy: Drivers can enter either their driving schedule or be ready for short-term requests while driving. Car passengers enter their requests and are matched with possible drivers. The network can serve both long-term and short-term ridesharing requests. The network is not intended to be used by passengers traveling to or from the airport.

3.2.3. Other on-demand services

Besides public transport, individual arrival and departures by car or bike, taxi and rental car services are available at the Vienna Airport as well. On the airport's website five different taxi companies are listed with contact details.[33] In Vienna, there is no need for special accreditations or certificates for taxi drivers to enter the terminal area. One interesting fact regarding the taxi companies is that taxis that are

[32] car2go Österreich GmbH, 2017 online

[33] Flughafen Wien AG, 2017f online

registered in Vienna are not supposed to pick up passengers at the airport (because the airport is located in the province of Lower Austria) and vice versa taxis from Lower Austria are not allowed to pick up passengers in Vienna unless they are pre-ordered by customers. So this means that many rides between Vienna and the airport are without any passengers. Besides the usual taxi companies, Uber operates in the Vienna Airport's FUA as well.

Another call-on-demand shuttle service operating between the Vienna airport and the City of Vienna is the company "ShuttleMe".[34] Passengers are able to book the shuttle service online by providing personal information e.g. about the desired arrival time at the airport and get notified about the actual pick-up tome 24 hours in advance. ShuttleMe aims at operate with a high occupancy rate, rides are pooled and therefore passengers may be collected up to one hour in advance of their desired pick-up time. When leaving the airport, a ShuttleMe bus is departing every 30 minutes. Prices vary depending on the proximity of the districts of Vienna to the airport, starting from €9.90 up to €14.90.[35]

Although there is a bus-on-demand system (called "Anruf Sammel Taxi" or "AST") in the municipality of Schwechat, where the airport is located, the airport itself is not served by this bus service - neither for employees nor for passengers.[36]

4. Mobility information systems

In Austria, different transport information systems/services exist. This is due to the comprehensive data base "Verkehrsauskunft Österreich" (VAO)[37] which provides multimodal travel information for Austria.VAO is a nation-wide, coordinated, intermodal and by infrastructure providers as well as transport mode operators/providers authorised routing platform. The routing platform includes information on individual motorized transport, public transport, cycling and walking and intermodal connections whereas most of the data is provided in real-time. The two information sources for mapping are the Graph Integration Platform (GIP) and an open source map.[38]

Since main stakeholders in the transport sector are development partners, promotors and/or data suppliers, they also integrate the service of the VAO in their own mobility information system; e.g. the federal motorway provider "ASFINAG" or the public transport association of the Eastern Austrian region ("VOR").

4.1. Description of existing mobility information systems

Since the goal of LAirA is to develop, test and implement an innovative ITS-tool that provides passengers and employees with relevant (pre-trip and on-trip) travel information, only digital services (i.e. applications for digital devices) are considered in this state of the art description.

Various digital mobility information systems exist in Austria, such as "AnachB", "Quando", "Wien mobil" or "Wegfinder", offering different functions (planning, booking, etc.), content and address different target groups . Recent developments also enabled the availability of the timetables of the Wiener Linien (the main public transport provider in Vienna) on Google Maps, which makes the travels to and from the airport for visitors easier than before. All aforementioned (and in general most popular)

[34] ShuttleMe 2015a online

[35] ShuttleMe 2015b online

[36] Stadtgemeinde Schwechat, 2017 online

[37] https://verkehrsauskunft.at/

[38] Verkehrsauskunft Österreich, 2017 online

programs/applications for digital devices (e.g. smartphones, tablets or computers) include the access to the airport of Vienna, i.e. the planning, booking and/or paying of trips to and from the airport.

An already well-established smartphone app for journey/route planning in Austria is “AnachB” which is provided by the public transport association “VOR” (see Figure 7). In contrary to Wegfinder the app AnachB provides route planning information including all kind of passenger transport modes and various intermodal interchange possibilities, however, ticketing is not available. The app requires no login or account registration for retrieving relevant information. These apps are usually also available in English.

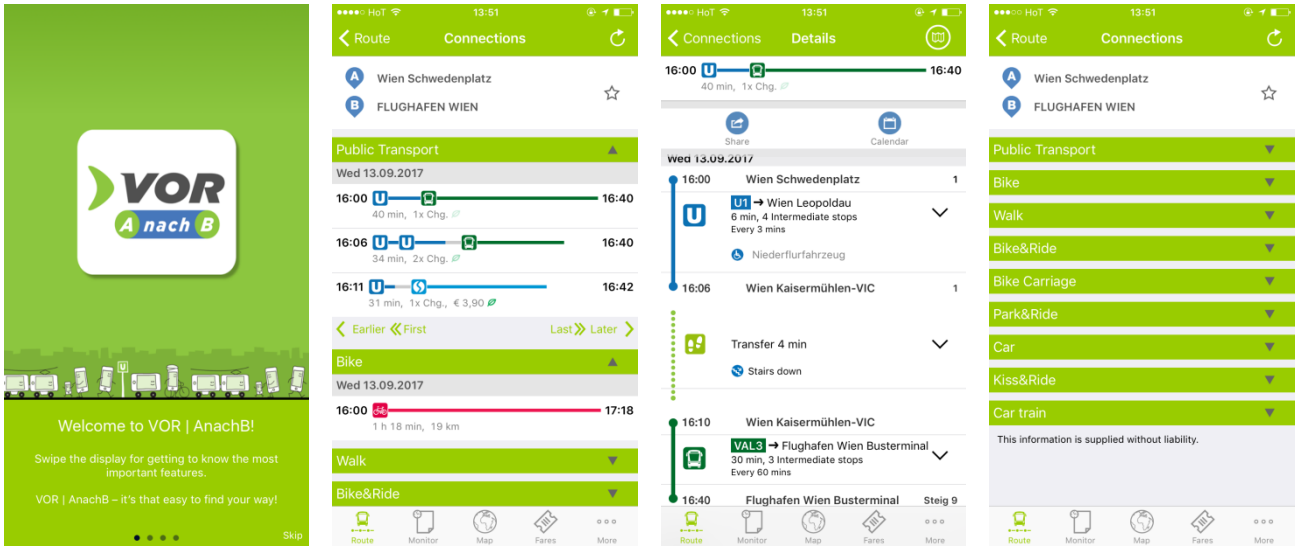

Figure 7: Screenshots AnachB App, Source: Verkehrsverbund Ost-Region (VOR) Gesellschaft m.b.H., 2017

A fairly new app is “Wegfinder”, provided by the iMobility GmbH, an Austrian start-up that is supported by the ÖBB. By using the Wegfinder app it is possible to plan routes from A to B by considering intermodal mobility options. The main intention of the app is to reduce the complexity of the representation of mobility offers and make suitable mobility options more feasible for transport users. By implementing the app, individual, flexible and ecological transport decisions (in terms of mode and route choice) should be promoted.[39] As shown in Figure 8 the Wegfinder smartphone app includes route planning, booking/ticketing for certain services, activation and deactivation of transport modes and personal settings in case of account registration/login.

[39] OTS/wegfinder.at, 2017 online

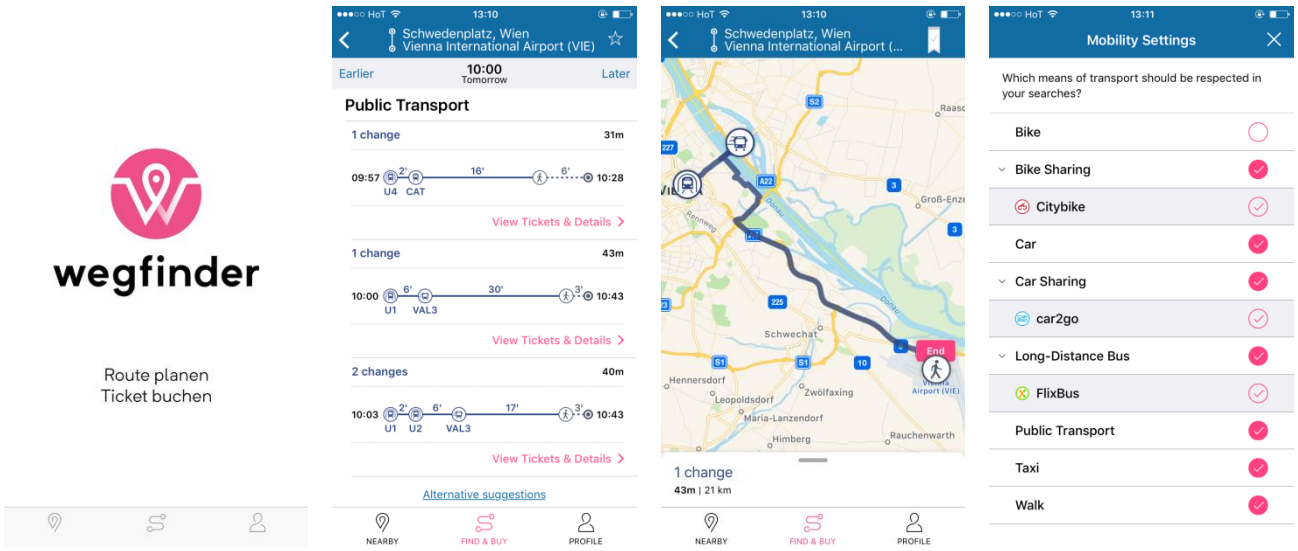

Figure 8: Screenshots Wegfinder App, Source: iMobility GmbH, 2017

Although there are various other route planning apps for mobile devices, there is no application that specifically addresses the needs of airport employees or passengers for travelling to and from the airport or between company buildings and airport infrastructure on site.

4.2. Potentials and gaps of mobility information services

The following aspects could be identified as current gaps and possible potentials for future enhancements:

- Lack of information on interchanges between public transport lines and the on-site Airport Shuttle
- Lack of integration of DRIVE2VIE in existing mobility information systems
- Lack of incentives for employees to use other modes than the private car
- Lack of available public transport for those working on nightshifts or having irregular working hours
- Lack of integration of surrounding municipalities in the public transport system and public transport options for employees coming from the province of Burgenland
- Private or company-related mobility services/options are not part of (commercial) mobility information systems
- Difficulties in finding information about private or company-related transport offers
- Availability of fixed tariff models that make services unattractive for some user groups
- Certain regulations for cab drivers and therefore empty runs between the airport and Vienna (there is a law that restricts pick-ups of passengers from another province unless it is pre-ordered)

5. Conclusion

The Airport of Vienna is very well accessible by road and rail. Especially during peak hours the frequency of local trains serving the airport with passengers and employees is high. By providing three different bus lines, the airport is well connected to different areas of Vienna. Within the FUA three more bus lines serve the airport. However, especially those regions that are in the immediate surrounding area of the airport are not very well reachable by public transport. There is one bus line connecting the airport with the norther part of the province of Burgenland and one course takes about an hour. When speaking of immediate surrounding areas or the municipalities located east of the airport, west of the City of Vienna or the south-eastern parts of the province of Burgenland, the access by car is the most convenient and probably even the most reasonable way of accessing the airport - for employees as well as for travellers. Train connections are available between Vienna, the airport and other small municipalities located north and east of Vienna. By implementing the direct train service between the airport and the City of Linz (Upper Austria), the catchment area for passengers traveling to and from the Vienna Airport could be expanded. This implementation is considered as one major achievement during the last years. Another big achievement was the implementation of the bicycle path between Vienna and the airport. Although, due to the location and weather conditions in this area (characterized by strong winds) and a total duration of around 75 minutes for one direction it can be assumed that this mode of transport is not chosen very often; especially not by passengers. Besides private cars and public transport services, also car-sharing companies and usual taxis are available for commuting to and from the airport. Furthermore, some companies implemented an informal ride-sharing network for commuters traveling to and from the airport. The Airport of Vienna is engaged in setting measurements for greener mobility solutions. However, especially those areas of the FUA have to be considered for further examinations that lack of alternative and acceptable mobility solutions.

Especially in the field of mobility information systems enhancements regarding the target groups of passengers and employees of the Vienna Airport seem conceivable. Lacks can be identified regarding the transition between the journey to/from the airport and the mobility services available at the airport. Offices are not always located in immediate distance to the train or bus stations and therefore an on-site

Airport Shuttle exists. However, this shuttle bus is not included in any digital or online mobility information system. Another lack appears when it comes to the informal and formal car- and ride-sharing options. Again, different isolated solutions/applications exist but are not integrated in existing information systems.

6. Sources

- ACI EUROPE, 2017 online. About Airport Carbon Accreditation. URL: http://www.airportcarbonaccreditation.org/about.html, retrieved on 29.08.2017, Vienna.
- Blaguss Reisen GmbH, 2017. Tickets und Preise. URL: https://air-liner.at/de/fernbustickets, retrieved on 29.08.2017, Vienna.
- Bundesministerium für Verkehr, Innovation und Technologie (bmvit), 2017. Zusammenfassende Erklärung gemäß § 9 Bundesgesetz über die strategische Prüfung im Verkehrsbereich (SP-V-Gesetz) betreffend die vorgeschlagene Netzveränderung im Schienenverkehrsnetz *Wien – Flughafen Wien - Bruck/Leitha – Staatsgrenze bei Nickelsdorf*. Vienna, June 2017.
- Car2go Österreich GmbH, 2017 online. FAQ. URL: https://www.car2go.com/AT/de/wien/faq/, retrieved on 18.09.2017, Vienna.
- Cerwenka, P., Klamer, M., Hauger, G., Hörl, B., 2007. Handbuch der Verkehrssystemplanung.
- Flughafen Wien Aktiengesellschaft AG, 2016 online. Preise. URL: http://www.viennaairport.com/jart/prj3/va/uploads/data-uploads/Passagier/Parken/VIE_Parkpreise_de.pdf, retrieved on 13.09.2017, Vienna.
- Flughafen Wien Aktiengesellschaft (AG), 2017. Geschäftsbericht 2016.
- Flughafen Wien Aktiengesellschaft (AG), 2017a online. Environmental protection. URL: http://www.viennaairport.com/en/company/flughafen_wien_ag/environment__sustainability/environmental_protection, retrieved on 29.08.2017, Vienna.
- Flughafen Wien Aktiengesellschaft AG, 2017b online. Busverbindungen. URL: http://www.viennaairport.com/passagiere/anreise__parken/busverbindungen, retrieved on 13.09.2017, Vienna.
- Flughafen Wien Aktiengesellschaft AG, 2017c online. Airport Shuttle. URL: http://www.viennaairport.com/jart/prj3/va/uploads/data-uploads/Businesspartner/Parken/VIE_AirportShuttle_Fahrplan_de.pdf, retrieved on 19.09.2017, Vienna.
- Flughafen Wien Aktiengesellschaft AG, 2017d online. Fahrkarten für den Airport Shuttle. URL: http://www.viennaairport.com/jart/prj3/va/uploads/data-uploads/Businesspartner/Parken/VIE_AirportShuttle_Infomappe_de.pdf, last updated on 01.01.2017, retrieved on 26.09.2017, Vienna.
- Flughafen Wien Aktiengesellschaft AG, 2017e online. Services rund ums parken. URL: http://www.viennaairport.com/passagiere/anreise__parken/services_rund_ums_parken, retrieved on 13.09.2017, Vienna.
- Flughafen Wien Aktiengesellschaft (AG), 2017f online. Taxis & Limousinen. URL: http://www.viennaairport.com/passagiere/anreise__parken/taxis__limousinen, retrieved on 29.08.2017, Vienna.
- iMobility GmbH, 2017. Screenshot from iOS App.
- nextbike GmbH, 2017. So geht's. URL: https://www.nextbike.at/de/niederoesterreich/information/, retrieved on 18.09.2017, Vienna.

- ÖBB-Postbus GmbH, 2017 online. BUCHEN. URL: https://www.viennaairportlines.at/de/, retrieved on 13.09.2017, Vienna.
- OECD, 2016a. Functional urban areas in OECD countries: Austria. June, 2016.
- OECD, 2016b. List of municipalities by functional urban areas. June, 2016.
- OECD, 2017a online. Functional urban areas by country. URL: http://www.oecd.org/cfe/regional-policy/functionalurbanareasbycountry.htm, retrieved on 28.08.2017, Vienna.
- OECD, 2017b online. Population in cities. URL: http://stats.oecd.org/Index.aspx?Datasetcode=CITIES, retrieved on 28.08.2017, Vienna.
- OTS/wegfinder.at, 2017 online. wegfinder App – Mobilität einfach gemacht. URL: https://www.ots.at/presseaussendung/OTS_20170413_OTS0055/wegfinder-app-mobilitaet-einfach-gemacht-bild, published on 13.04.2017, retrieved on 13.09.2017, Vienna.
- ShuttleMe 2015a, online. Die völlig neue Fahrgemeinschaft! URL: http://www.shuttle-me.at/, retrieved on 19.09.2017, Vienna.
- ShuttleMe 2015b, online. Verfügbarkeit und Preise. URL http://www.shuttle-me.at/index.htm#article-three, retrieved on 19.09.2017, Vienna.
- SMATRICS GmbH & Co KG, 2016 online. E-MOBILITY HEBT AB. URL: https://smatrics.com/news/vienna-international-airport#, published on 03.06.2016, retrieved on 13.09.2017, Vienna.
- SMATRICS GmbH & Co KG, 2017 online. Ladeanleitung. URL: https://smatrics.com/ladeanleitung#, retrieved on 13.09.2017, Vienna.
- Stadtgemeinde Schwechat, 2017 online. Anruf Sammel Taxi. URL: http://www.schwechat.gv.at/de/verkehr/ast/200/Anruf-Sammel-Taxi, retrieved on 19.09.2017, Vienna.
- Verkehrsauskunft Österreich, 2017 online.Inhalte. URL: https://verkehrsauskunft.at/#inhalte, retrieved on 28.08.2017, Vienna.
- Verkehrsverbund Ost-Region (VOR) Gesellschaft m.b.H., 2017. Screenshot from iOS App.
- Verkehrsverbund Ost-Region (VOR) GmbH, 2017 online. Routenplaner. URL: https://anachb.vor.at, retrieved on 09.08.2017, Vienna.