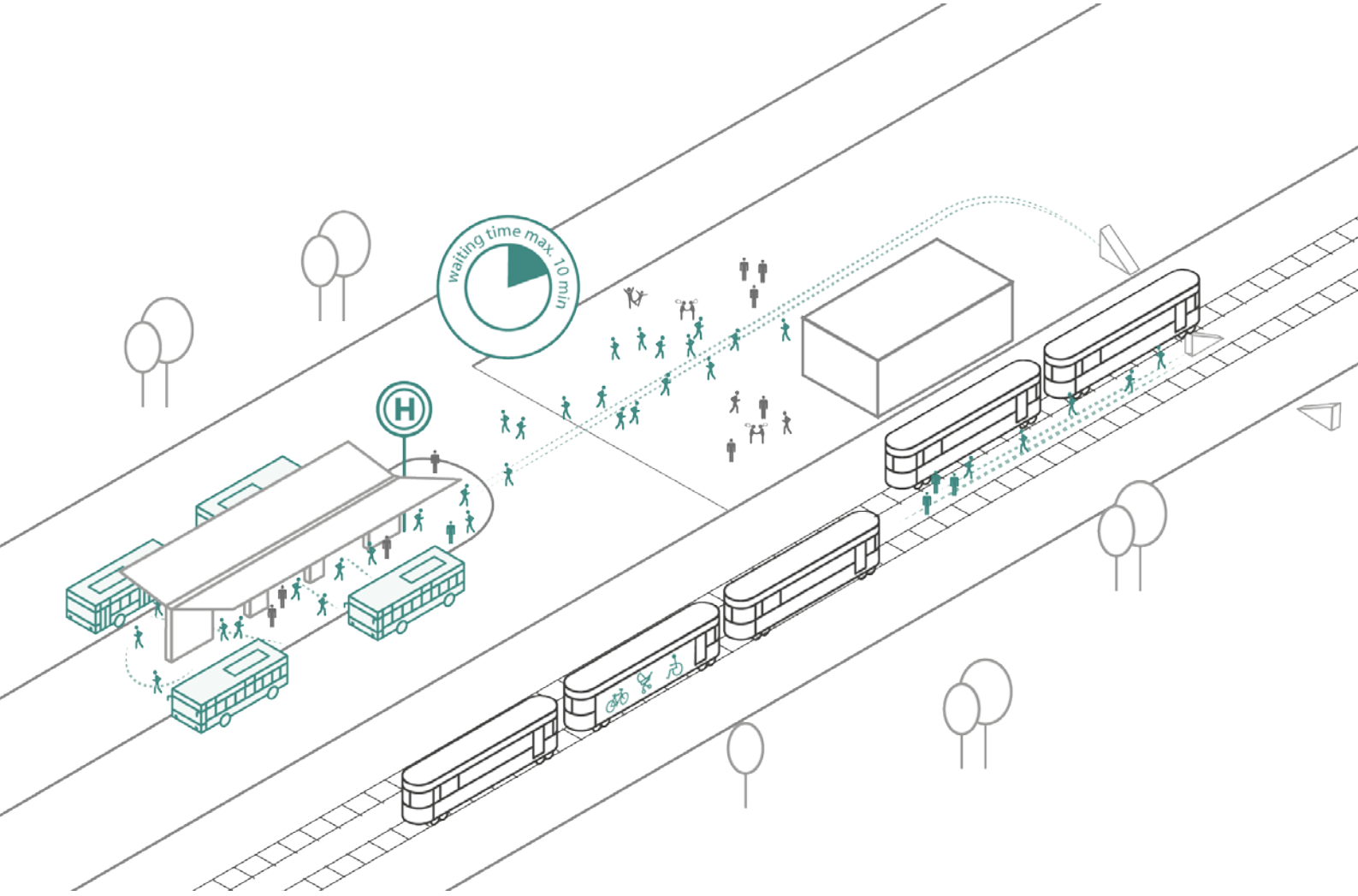
SUMBA
Commuting Master Plan



Free and Hanseatic City of Hamburg
Borough of Altona

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SUMBA

Commuting Master Plan

Part 1

Status analysis and commuter survey

Contents

Executive Summary

The Commuting Master Plan outlines the foundations and the first approaches for the development of a sustainable, climate-friendly commuter concept for the settlement corridor between Pinneberg and the Borough of Altona in the Hamburg metropolitan region.

Numerous plans at state, borough and municipal level are already in place today, based on the criteria of sustainability and climate protection. Nevertheless, these plans are currently proving difficult to coordinate. There is no regional planning organisation that is equipped with the necessary competencies for the entire settlement and transport area as a unit.

Through an online survey carried out as part of the SUMBA project, the mobility behaviour and patterns of commuters from Pinneberg County could for the first time be presented in a manner that is specific to the region. In the process, areas with motorised private transport (MPT) and public transport (PT) connections could be clearly identified. Areas with an affinity to MPT are areas where people live who, on average, commute between Pinneberg County and the Free and Hanseatic City of Hamburg with a proportion of MPT of over 40%. On the other hand, people who commute to Hamburg with an average PT share of more than 60% live in regions with a high level of PT.

With the insights gained from the survey and interviews, 10 key measures were developed together with the project partners in the form of fact sheets and in a manner geared towards implementation. The study pre-evaluated a number of different strategic approaches.

The study clearly identifies a differentiation in commuter mobility behaviour. The

The experience gained during the Corona crisis will reveal the influence home offices and the rapid spread of e-bikes may have on commuter traffic in the future.

traffic commuting to Hamburg continues to play the central role. Nevertheless, the regional commuter traffic is increasing proportionally and tends to follow rather dispersive chains of transportation. Conducting interviews among commuters in Pinneberg County with a destination in Hamburg reveals the long distances people travel in their everyday lives. The transport infrastructure - whether road or rail - is trailing behind this trend.

The survey indicates that the vast majority of people are prepared to make use of efficient and attractive regional transport for their journey to work. The bicycle plays a particularly important role as a means of reaching other forms of transport and for longer distances with electric support.

The experts who are involved clearly advocate a qualification and expansion of the public transport system. At the same time, however, they highlight that the implementation of these much-needed measures is currently only possible in the long term and is made more difficult by administrative and legal complexities. It will also be necessary to invest in outdated technology (signal boxes) prior to expansion.

Thus, in addition to setting the strategic course for the expansion of the regional rail passenger transport (RRPT), it is essential to take the first concrete steps in the implementation of the Commuting Master Plan with effective measures that can be implemented in the short term in the areas of mobility management, digitalisation and ridesharing.

Furthermore, the course must be set at state, federal and EU level to establish a regional association that is significantly strengthened in its transport planning competence.

Introduction

For many people, commuting is part of their everyday lives. Every working person wants to reach their workplace as quickly, reliably, economically and trouble-free as possible. Cities and municipalities are seeking to provide the transport infrastructure needed for this. However, achieving safe and smooth commuter traffic as a planning objective is no longer enough. Climate protection has become an increasingly important aspect. In the future, cities and local authorities will have to design the day-to-day commuting to work in such a way that as few resources as possible (energy, time, space, urban space) are consumed. What is more, the sustained migration to the congested urban areas is increasing the pressure on the transport systems.

This study, which is carried out as part of the EU SUMBA project, outlines the foundations and the first approaches for the development of a sustainable, climate-friendly commuter master plan for the settlement corridors of Pinneberg-Altona in the Hamburg metropolitan region.

The EU puts commuter transport in the spotlight

The Borough of Altona is a "lead partner" in the Interreg research project SUMBA (Sustainable urban mobility and commuting in Baltic cities). The project aims to develop concepts for the environmentally sustainable design of commuter transport in the pilot regions Hamburg-Altona, Tallinn and Tartu (Estonia), Riga (Latvia), Växjö (Sweden), Šiauliai (Lithuania) and Olsztyn (Poland). These concepts should provide solution options and action paths for urban and transport planning on site.

In Altona, the regionally integrated areas with Pinneberg County was looked into. This area represents only a section of the entire metropolitan region.

Point of departure

It can be observed throughout the whole of Europe that the transport sector has so far shown the least progress in terms of CO2 savings. Admittedly, new and improved drive systems and filters have made vehicle fleets in both public transport and private transport much more environmentally friendly in recent decades. However, as a result of the continued and steadily growing increase in traffic, particularly in agglomeration areas, these technical savings effects were offset by rebound effects in the overall balance by 40 to 60% (Frondel 2009).

As such, the transport sector currently accounts for 28% of the total emissions in the Hanseatic city. Each year, 4,565,000 t of CO2 are released. In line with the polluter pays principle (excluding external commuter traffic), 663,000 t (27%) of this falls within the Borough of Altona, which has a population share of 14.5% in Hamburg (BUE 2019). Commuter movements are becoming more extensive and complex due to the strong population growth, also in the rural areas. If it were possible to avoid commuter traffic or to organise it more efficiently and hence more environmentally friendly, local authorities could make an important contribution to climate protection.

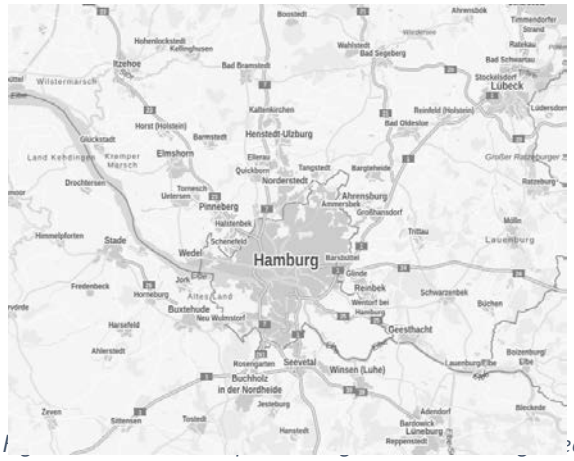
Core questions

Integrated spatial planning should endeavour to avoid commuter traffic. But since commuter traffic will continue to exist for the foreseeable future, the question arises as to how this can be improved to reduce emissions in the Pinneberg-Altona corridor and whether

other European regions with similar starting situations can learn from this approach. The study will examine the following questions in more detail:

- How do people from Pinneberg County travel to Hamburg on their way to work? Which modes of transport do they use and why?
- How can commuters be persuaded to choose more environmentally friendly modes of transport?
- Which existing planning needs to be optimised to achieve this, which additional measures are necessary?
- What distribution of responsibilities does this entail at the EU, federal, state, regional and local levels? Where should there be greater emphasis on developing collaboration? What responsibilities fall to the metropolitan region?

The Commuter Master Plan seeks to present and pretest suitable measures at regional level which offer the potential to make commuter traffic between Pinneberg County and the Borough of Altona more environmentally friendly. Furthermore, it will be discussed how cross-border collaborative structures can purposefully combine resources and responsibilities and promote the strategic planning of sustainable commuter mobility in the future.



(Source: Geoportal Metropolregion Hamburg)

Approach

The first step in formulating effective solutions was to carry out a status analysis of the commuter system in the study area and to evaluate it in a SWOT analysis together with the SUMBA panel of experts. The mobility behaviour and the needs of commuters were also analysed. For this purpose, an online survey was conducted in Pinneberg County concerning traffic and mobility behaviour on the way to work. This identifies which local factors play a role when choosing a transport mode. In a second step, discussions were held with the stakeholders. Here it was discussed which measures are already planned and what needs to be considered from a practical point of view during implementation.

Under the leadership of the Borough of Altona, initial pathways to a solution have been developed from these talks. The measures which have been prioritised by the stakeholders are summarised in fact sheets and evaluated by experts at the end of the work with regard to SUMBA. The processing is arranged as follows:

1. **Stocktaking:** Description of the area to be studied - *expert*; description of the framework conditions - *Borough of Altona*
2. **Questioning:** Outcomes of the online and offline survey - *expert*
3. **Stakeholder discussions:** Report on the stakeholder discussions conducted - *expert*
4. **Conceptual preliminary considerations:** SWOT analysis, central idea, trends - *Borough of Altona*
5. **Measures:** Overview and description of the measures and preliminary evaluation in fact sheets - *expert*
6. **Recommendations for action**: from the expert's point of view

Stakeholders involved

A number of stakeholders were involved in the creation of the commuter concept. The EU project SUMBA was supervised by regular meetings of the "SUMBA expert team". This group comprised representatives from the municipal administration as well as from the public transport sector. Alongside the Borough of Altona Office (Department for Urban and Landscape Planning (MR) and Department for Public Space Management (SL)), the Ministry for Transport and Mobility Turnaround (BVM; formerly the Ministry for Economics, Transport and Innovation (BWVI)), the Agency of Roads, Bridges and Water (LSBG), the metropolitan region of Hamburg, Pinneberg County, the Hamburg Transport Association (HVV), Hamburg Holstein Transport Ltd (VHH), the Hamburger Hochbahn, S-Bahn Hamburg and SVG Südostholstein were represented. The meetings were also accompanied by the Baltic Environmental Forum Deutschland e.V., who was responsible for project management. The towns and municipalities in Pinneberg County participated via the County administration. The general public was involved in the commuter survey. International exchanges took place with the SUMBA consortium, which regularly discussed the development of the commuter master plans (CMP). The structure of the CMP was also conceived at a higher level, so that the partner cities scattered across the Baltic Sea region could produce comparable documents. The German Aerospace Centre (DLR) provided scientific support and guidance.

Establishment and implementation of the commuter concept

The presented concept does not refer to an administratively compiled unit and therefore cannot be decided and implemented by a single political body. Instead, the measures as described are to be incorporated into a large number of binding development plans and concepts.

The main focus here lies on the climate protection sub-concept (CPSC) for mobility in the Borough of Altona, which should be finalised in early 2021. Measures relating to the Altona area are to be incorporated into this concept. A monitoring concept will be devised for the CPSC, which will include the SUMBA measures wherever possible.

The BVM is responsible for establishing this at the city-wide level and can implement it as part of its continuous traffic development planning.

Measures in Pinneberg County should be incorporated into the Borough's development concept and the local transportation plan and be updated in the course of these.

Moreover, the metropolitan region of Hamburg was to take up the concept and promote its implementation.

A number of the proposed measures have already been integrated into other plans, in particular the Hamburg Climate Plan. Its establishment in the integrated climate protection concept for the Borough of Altona took place at the beginning of 2019 with its resolution.

Stocktaking

The Hamburg metropolitan region offers a wide range of workplaces for various occupational groups. The majority of the workplaces are located in Hamburg's urban area. However, the surrounding areas are also gaining in importance. Over the past few years, Pinneberg County has been witnessing a disproportionate increase in the number of workplaces. As a result, commuter relations are undergoing a change. People are commuting more and for longer periods of time, but also in a more varied way. The balance of commuters entering and leaving the area being studied is shifting in favour of the surrounding region. While both public transport and motorised private transport are available in the area, private transport clearly dominates in the regional commuter traffic with increasing distance and decentralised workplace locations.

Demarcation of the study area

The study area covers the Borough of Altona in the west of Hamburg and Pinneberg County in Schleswig-Holstein, which borders on the west. The area does not presently constitute an administrative unit.

Figure 2. Administrative demarcation

Population and employment figures

A total of around 313,000 people live in Pinneberg County. In the Borough of Altona there are currently approximately 273,000 inhabitants. With a population density of 3,364 inhabitants per square kilometre, Altona ranks among the more densely populated Boroughs of Hamburg (statistik-nord 2019_1).

The demographic structure is diverse, ranging from affluent small-town communities and family-oriented suburbs to urban, student-centred and creative forms of housing. Suburban forms of housing dominate in Pinneberg County: familial, but also rural, small-town and reasonably priced.

The Hanseatic city represents an important workplace location for transportation and logistics, health care, banks, administration and technology. As an example: 12,000 people are employed at Airbus in Finkenwerder alone. Numerous workplaces are situated in extended inner-city locations, but the airport, the port and the hospitals (ENDO-Klinik, Eppendorf University Hospital) are also counted among the places with high employment density. It is estimated that up to 15,000 jobs will be created in Science City Bahrenfeld.

A spatial distribution of job offers can be observed. For some decades now, especially companies requiring a significant amount of land have been settling in the surrounding area (examples: Tesa in Norderstedt, Amazon in Winsen). Pinneberg County is also profiting from this trend. Traditionally, horticulture plays an important role here. However, as a result of increasing urbanisation and benefiting from a favourable location in terms of transport, many small and medium-sized companies from various sectors have now relocated to the area.

Settlement structure and density

The rural Pinneberg County is characterised by settlement axes that follow Fritz Schumacher's Hamburg Axes Model. This model describes a settlement development that spreads from the city towards the region (FHH 2007). The area consists of the three settlement axes Pinneberg–Hamburg, Quickborn–Hamburg, and Wedel–Hamburg and is the most densely populated area in Schleswig-Holstein and in the metropolitan region. The spaces between the axes are still partly rural.

There is a lot of perimeter and ribbon development in urban areas with a greater variety of uses and a higher density of workplaces. Single-family and smaller multi-family houses with a smaller mixture of functions dominate in the outskirts (Fig. 3). A lower settlement density is observed in the Elbe area and between the settlement axes. When public transport routes are introduced, the population density is usually somewhat higher. However, even here there is still potential for retroactive densification.

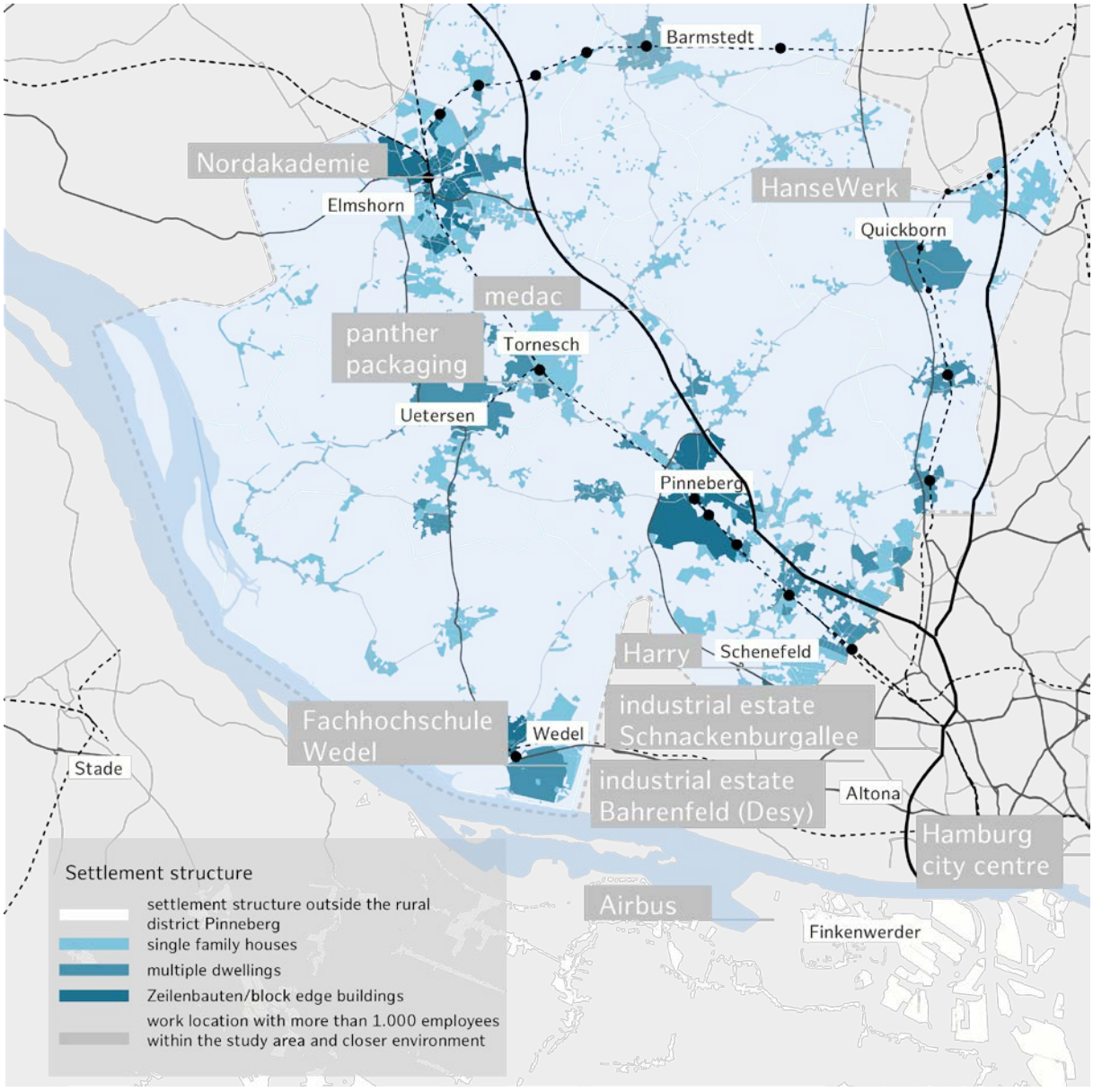


Figure 3. Settlement structure, important residential and workplace locations

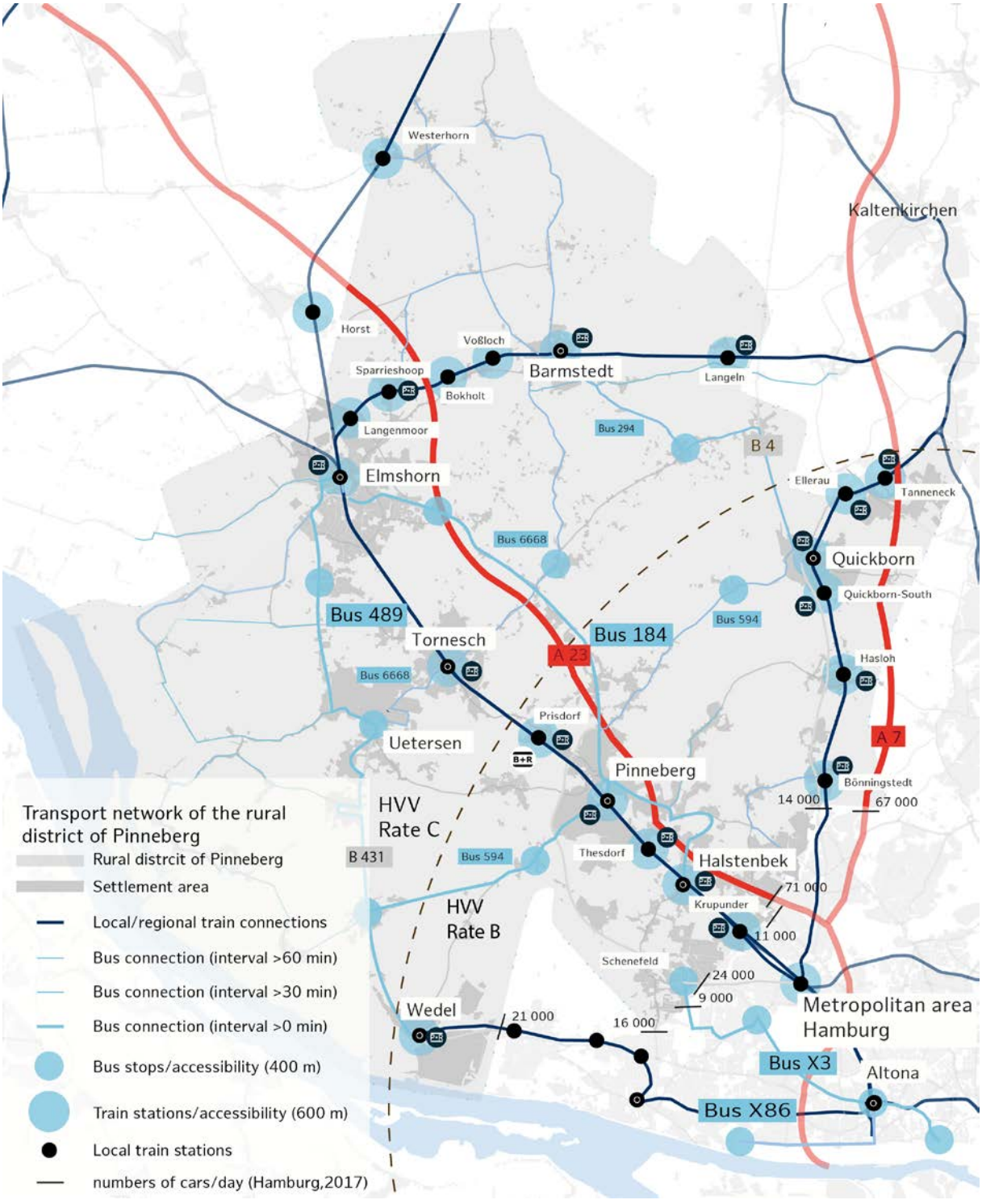


Figure 4. Current status of the transport network – MPT and PT

Transport system

Transport network

The transport network follows the three settlement axes (cf. Figure 4). The road network provides access to the workplaces in the inner city as well as the industrial and commercial areas on the outskirts of the city (airport, Airbus). This means that a large number of important workplace locations within the metropolis can in principle (without traffic jams or accidents) be reached within a 30-minute radius by car (see p.37).

Both federal highways serving long-distance traffic as per Section 1 of the Federal Highway Act (BFStrG)[1] are located in the axes. Thanks to their location in the area and their direct connection to the commercial areas, federal autobahn BAB23 and BAB7 are a good infrastructure solution for commuter traffic.

The regional rail passenger transport (RRPT) network almost represents a central line in the settlement corridors. The S21 line leads from Elbgaustrasse via Diebsteich to Aumühle. Via the main railway station, the S3 line connects Pinneberg with the city and the workplaces there and continues along the Elbe to Stade. AKN operates the A1 line from Eidelstedt station (which will be extended to become the S-Bahn urban railway by 2025) to Kaltenkirchen.

In Pinneberg County	50,760
In Harburg Coutny	45,310
In Stormarn County	40,000
In Segeberg County	33,750
In Stade County	20,640

Figure 5. Number of commuters coming from Hamburg

The A3 line, which links Pinneberg and Henstedt-Ulzburg as a local tangential connection, is quite unique, since there are hardly any tangential connections in the regional rail passenger transport network in Hamburg. The S1 line connects Wedel.

Bus services provide access to the area. Metro and express buses cover the most highly frequented routes.

There is currently no efficient commuter bicycle network. A feasibility study is underway for an expressway for cyclists between Hamburg and Elmshorn, as one of nine in the metropolitan region. Bike-and-ride facilities are available at some stations. Within Hamburg's city limits, the B+R offering is gradually being expanded. In general, municipal cycle path networks are not systematically developed.

Commuter relations

Approximately 130,000 employees subject to compulsory social insurance live in Pinneberg County (Statistik Nord 2019_2). The County reveals a negative commuter balance. A good 70,000 people from Pinneberg County alone commute to their workplace in the Hanseatic City of Hamburg. Meanwhile, some 50,000 Hamburg residents commute to their work in Pinneberg County (Fig. 5).

The commuter atlas (Pendleratlas 2019) clearly shows the strong interconnections in the region. People from Pinneberg County travel as far as Hanover, Kiel or Bremen to get to work.

While the number of people commuting to Hamburg continues to grow and the Hanseatic city remains the undisputed economic and cultural heart of the region, the number of commuters to the County is also increasing, 10% in the years from 2013 to 2018 alone (Kreis Pinneberg website). This means that residents of Hamburg are now increasingly taking on jobs in the surrounding area. Pinneberg County

[1] With a total length of 960 kilometres, the A7 is one of the most efficient transport corridors in Europe, providing access to Germany along almost the entire north-south axis.

plays an important role in this regard. No other County records such a high number of commuters from Hamburg:

In terms of the modal split, cars clearly dominate with 77%, followed by public transport with 21% (MID HH, 2019: 81). The conclusion can be drawn that without a car, jobs in the surrounding area are much less attractive for commuters from Hamburg.

One thing is clear: Travelling to or from the surrounding areas usually means travelling by car. Cars dominate the regional traffic. Even city residents are switching to car-oriented mobility cultures for travelling in the region.

Traffic density

The road network in the area of study is heavily used or sometimes even overburdened: On weekdays, 77,000 cars travel on autobahn A23 in the sections within the study area. The ADTw (average daily traffic, working days) of autobahn A7 in the area reaches 127,000 cars/24h. The major roads are also highly congested, particularly in the inner-city area (Luruper Chaussee 26,000 ADTw, Osdorfer Landstrasse 46,000 ADTw, Kieler Strasse 63,000 ADTw) (Metaver.de 2020).

The figures that can be determined for public transport passengers lie well below these values. The HVV states that the average number of passengers in both main directions between the Borough of Altona and Pinneberg County on working days (Mon-Fri) averages around 23,000 per working day for bus lines 2, 3, 21, 37, 184, 186, 189 and 285 as well as the A1, S1 and S3 railway lines (with the exception of the regional railway).[2]

These two values cannot be compared directly with each other, because on the highways, long-distance journeys are also counted. It would be better to compare the figures for peak traffic during working days. There is nonetheless a clear weighting in favour of cars.

[2] Information from the HVV in the context of a stake-holder meeting held on 10.02.2020

Main modes of transport (modal split)

The modal split values as a further parameter clearly illustrate the difference between a Borough and a Coutny. People in Pinneberg County exhibit different mobility behaviour to those in Altona:

The core area of Altona (Altona-Altstadt, Ottensen, Altona-Nord, Bahrenfeld) is a good example of a borough with distinct urban mobility patterns: Compared to the city as a whole, many people either make their way on foot or use a bicycle. The use of public transport is far above average when compared to the state and federal levels. It is relatively rare for people in Altona to make use of their own car. On the other hand, Pinneberg County is characterised by a rather suburban mobility culture: A lot of people have their own car and rely on it. In the County, the proportion of pedestrians is relatively high and people are using their bicycles. But in rush-hour traffic - with the exception of school traffic - the bicycle plays a lesser role than in the congested city.

	Metropolitan region Hamburg	Pinneberg Coutny	Borough of Altona
MPT	52 %	52 %[1] *1 Of which 13% are passengers*	31 %
On foot	22 %	21 %	28 %
By bicycle	13 %	16 %	22 %
PT	12 %	10 %	19 %
Source	*MID 2019 MRH, p.36*	*MID 2017 Bund*	*MID 2019_2*

Figure 6. Modal split parameters[3]

Travel distances

The results from the survey indicate that the average commuting distance in Altona is 9 kilometres, and nearly half of the commutes are under 5 kilometres long. By contrast, the average distance in Pinneberg County amounts to 32 kilometres, and the average commuter from Pinneberg County has to put up with considerably longer commutes in everyday life.

PT intervals, fare limits

The entire area of the study is located within the HVV area (fare rings A– E). The intervals vary greatly. The S1 and A1 run every 10 minutes during rush hour. Outside rush hour, the S1 and A1 travel north from Quickborn at 20-minute intervals. The S3 runs in 10-minute intervals throughout the entire day. The regional trains only run every 60 minutes.[4] There are often bottlenecks and overcrowded trains during peak times. The frequencies of the buses vary between 10 minutes on the main routes and up to 60 minutes or more in the areas that are less densely populated.

"Almost all residents of Pinneberg County (92%) live within easy reach of a bus stop. However, 14% live in the vicinity of a bus stop with at least one bus line that runs every 10 minutes." (Winkler 2020)

Participation in traffic: Motor vehicle registrations, bicycle database, Monthly HVV passes

Traffic participation varies between Pinneberg County and the Altona region: There are a significant number of households in Altona without their own car. With 233 cars/1000 inhabitants, the mobility indicator here falls well below the Hamburg and the national average of 555 cars/1000 inhabitants (2016).

[3] The values are based on different methods of calculation. Inbound commuters are not always included. It can therefore be anticipated that the values from Altona in 2008 will shift by approx. 3 to 5% to the detriment of public transport and local traffic if the daytime population is taken into account. It can likewise be assumed that the MPT value has dropped somewhat since 2008.

[4] Whereby there are more frequent intervals on track sections if several lines operate there.

Conversely, in Pinneberg County, on average every household owns a car, which is well above the Altona average, but still below the averages of the other Counties surrounding Hamburg. There are also on average two bicycles in each household. Access to a bicycle parking facility is within easy reach.[5]

At the same time, the number of cars owned is steadily increasing.[6] Throughout the entire metropolitan region, a high level of car ownership coincides with a high economic status of the respective household.

According to the 2019 MID report, 68% of the public transport tickets normally used in Pinneberg County are one-way tickets, day tickets or short-distance tickets. Only 12% of people living in the County have subscribed to a monthly HVV pass. In Hamburg this figure is 26% (MID 2019).

Combination of the modes of transport (intermodality)

Park and ride (P+R) facilities are available at almost all regional rail passenger transport stops in the study area. These are free of charge in Pinneberg County, with the exception of the P+R facilities in Elmshorn (2.40€/24h-4.80€/24h). Since 2014, a fee of 2.00€/24h has been charged in the Hamburg city area. There are only a few P+R facilities in Altona, which are mostly located on the periphery.

Currently, safe or lockable bicycle parking facilities at the stations are available in Prisdorf (quantity: 40), Quickborn-Süd (55), Elmshorn (400, bicycle parking garage), Ellerau (5) and Wedel (64). Freely accessible bicycle stores, some of which are protected from the weather, are available at all stations in the County. nextbike rental bicycles are available at the Quickborn and Tanneneck train stations.

Information platforms, *Pendlerportal* commuter portal

To date, only commercial navigation systems offer comprehensive information on the current traffic situation as well as route guidance services. *Pendlerportal* is a commuter platform for finding and arranging carpools in the region. However, it resulted in comparatively few carpools, so much so that the Hamburg metropolitan region as a whole decided to discontinue support. An evaluation report concluded that the organisation at a decentralised level weakened the service and was only able to act as a carpooling intermediary in a manner that was insufficiently sustainable (MRH 2014).

[5] According to the 2017 MID report, 68% of those questioned describe the parking facilities for bicycles at their place of residence as “very good”.

[6] According to the Federal Motor Transport Authority, the vehicle population throughout Germany has increased by 1.7% in 2018 (1.1 million vehicles).

Administrative framework

The administrative responsibilities in the Hamburg metropolitan region are complex. There is no regional planning organisation that is equipped with the necessary competencies for the entire settlement and transport area as a single unit.

Numerous plans at state, County and municipal level are already in place, based on the criteria of sustainability and climate protection. However, the various plans are currently difficult to coordinate.

Stakeholder and governance structure

Administrative structure

The administrative situation in Hamburg is quite different from that of most other German cities.

With a population of close to two million, Hamburg is one of the three German city-states. Consequently, the city-wide government, the Senate, operates at state level, while the seven Boroughs have most of the typical municipal responsibilities (e.g. land utilisation).

Pinneberg County is one of 11 Counties in the federal state of Schleswig-Holstein.

The Hamburg Metropolitan Region is a union of the Free and Hanseatic City of Hamburg with 20 of the surrounding administrative Counties and cities in the neighbouring federal states of Schleswig-Holstein, Lower Saxony and Mecklenburg-Vorpommern, as well as with chambers of industry and commerce, chambers of trade, business associations and the DGB Nord (Confederation of German Trade Unions Region North). The region has a population of about five million. This is an association of cooperation without formal planning authority. As stated in Art. 2 (1) sentence 2 of the cooperation agreement, "the Hamburg metropolitan region seeks to promote its economic, technological, spatial, social and cultural development as a common economic and living space," but it has no planning sovereignty.

The Organisation for Economic Cooperation and Development (OECD) presented a report concerning the development of the Hamburg metropolitan region in September 2019. The report points out that this metropolitan region has fallen behind southern German regions, even though no reason exists for this in terms of economic data (OECD 2019).

Compartmentalised decision-making structures constitute one of the main obstacles to development. Some of the proposals of the OECD include the establishment of an innovation agency as well as a regional planning network for transport, housing and spatial planning (OECD 2019).

The metropolitan region of Hamburg is considered an institution with high potential, as it could strengthen cross-border cooperation between federal states. There is, however, insufficient political will to transfer planning competences to the level of the metropolitan region.

Responsibilities in the transport sector

The transport sector is apportioned to different players:

Roads

As far as roads are concerned, responsibility is divided in Hamburg and depends on the size and importance of the respective road. All main roads are under the responsibility of the State Agency for Roads, Bridges and Waters (LSBG), which in turn is linked to the Ministry for Transport and Mobility Turnaround (BVM) and serves as provider of public works for the federal government. Roads that have no major

significance for the city as a whole are managed by the Boroughs, which are responsible for providing public services.

In Schleswig-Holstein, the Ministry for Economic Affairs, Transport, Labour, Technology and Tourism is responsible for all the main roads. Within the Ministry, the Department of Transportation and Road Construction is responsible for the highways as well as the federal and state roads, all of which are essential connections within the country. The County roads are managed by Pinneberg County, and the municipal roads are the responsibility of the respective municipalities.

Local public transport (LPT)

The HVV as an institution of the 3 federal states and 7 Counties or administrative districts involved is responsible for managing the public transport system in the inner metropolitan region. A total of 23 transport companies are operating under the umbrella of the HVV on behalf of the public transport authorities. For some years now, the HVV has been offering other mobility services in addition to rail and bus, or has been testing their implementation. These services include car sharing systems as well as the publicly funded StadtRAD city bike programme and the ridesharing service IOKI.

Bicycle traffic

The planning of bicycle traffic was the sole responsibility of the local administration (municipality, borough, district) for a long time. The planning of the boroughs and the Senate in the Free and Hanseatic City of Hamburg is summarised in the Alliance for Cycling and is coordinated by a bicycle traffic officer. Pinneberg County has been supporting municipal investment in the expansion of cycling infrastructure using a district concept since 2019. This is coordinated by a bicycle traffic officer in the County. The rising importance of cycling means that new responsibilities (federal, state, regional) and approaches to its promotion and funding are being tested, such as with the Alliance for Cycling in Hamburg. Express cycle paths are being funded by the federal government, thus creating new infrastructure specially designed to meet the needs of commuters (biking along on paths that are mainly 4 metres wide and separate from other means of transport with as few intersections as possible).

Figure 7. Feasibility study on express cycle paths in the Hamburg metropolitan region (OpenStreetMapODbL 1.0/ Metropolregion Hamburg)

New mobility services

There is considerable, almost global momentum in the field of digitally supported passenger transport, especially in the centres of major metropolitan areas. Private providers as well as associations are developing apps in order to establish carpooling and new forms of transport as a business segment. At present, it is difficult to assess its profitability and sustainability, and users do not have a clear overall view of the market. While it is relatively easy to develop and deploy an app, it is more difficult for start-ups in the IT industry to provide the service with real and financially viable transport offers. Only through appropriate network effects can the business models become profitable. Following an initial euphoria, the role of the new sharing/pooling providers organised on a private sector basis is now being qualified in transport research (Öko-Institut 2018).

It will only become clear in the future which areas (data collection, marketing, passenger or freight transport with or without drivers) can be permanently integrated into the urban mobility mix in

a way that makes sense. The first cities and transport associations are currently experimenting with collaborations, such as the above-mentioned examples from Hamburg, Switchh and IOKI.

Urban and transport planning

The challenge of sustainability

Climate protection and sustainability are becoming increasingly important in planning and legislation.

The Hamburg Senate adopted the Hamburg Climate Plan in 2015, which was updated in 2019 with more ambitious targets for reducing greenhouse gases.[7] The "Mobility Transition Transformation Path" contains a number of concrete measures and targets for CO2 reduction and modal shift.

The integrated climate protection concept for the region of Altona was adopted in 2019. With the printed document 21-9009, the Borough Assembly of Altona declared Altona a climate protection Borough and once again emphasised the prioritising of the goals. A broad range of sectors are addressed. As far as transport and mobility are concerned, reference is made to the climate protection sub-concept for mobility, which is to be developed until early 2021.[8]

A transport development plan (TDP) is currently being drafted and is scheduled to be completed in 2022.

The Mobility Programme 2013 was established in preparation for the TDP, which contains data sheets with the various measures that are relevant to the transport and mobility sector and that are being planned in Hamburg (FHH 2013). These data sheets were regularly updated.

In 2013, the Ministry of Environment and Energy at the time drew up a Noise Action Plan for the Hanseatic city. The proposed measures focus on road traffic, which has been identified as the principal source of noise emissions.

The first Clean Air Programme for the Free and Hanseatic City of Hamburg was already drawn up in 2004. The valid version, the 2nd update from 2017, is now undergoing a further revision (BUE 2017).

Pinneberg County has been working towards sustainable development and climate protection since 2008. A framework concept laid down by the County council specifies the fields of action as well as the objectives. The towns and municipalities in the County have also drawn up noise action plans.

As far as MPT is concerned, the County is particularly focused on car models that are significantly more economical along with a transformation in the way people move around. This also applies to the administration of the County: The fleet of vehicles was converted to 100% electric mobility in spring 2020.

When it comes to local public transport (LPT), Pinneberg County traditionally pursues policies that focus on attractive conditions has expanded its commitment over the last two years.

Urban planning

In accordance with Section 1(3) of the Federal Building Code (BauGB), urban planning is subject to municipal jurisdiction.

With the 2009 District Development Concept, Pinneberg County presented a development concept that is coordinated with other areas of interest, including transport planning. In Hamburg, the objectives at borough level are being combined with IUDC procedures. In this context, the creation of new living space as quickly as possible and in line with demand plays a particularly important role. The "Alliance for Housing" (FH Hamburg_2) was initiated in Hamburg as

[7] 55% CO2 reduction by 2030, climate neutrality/min. 95% CO2 reduction by 2050 compared to base year 1990, polluter pays principle

[8] At the time of finalising this report, the document was not yet finalised.

a residential offensive to promote housing construction.

In spite of the high building density, the Altona region has identified the potential for 19,900 additional residential units. The largest development areas comprise Mitte Altona (conversion of the traffic area) and the Holsten site (conversion of the industrial area), Science City Bahrenfeld on and around the trotting track area as well as the framework planning for Diebsteich in connection with the relocation of Altona's main-line railway station.

There is a boom in private residential construction in Pinneberg County, with suburban construction activities being dominant (shz 2020). Nonetheless, even here the development of apartment complexes in densely populated areas with good transport infrastructure is necessary.

A balance sheet of Investitionsbank Schleswig-Holstein reports that over 210 million euros in low-interest loans have been granted to investors since 2015 (Hamburg Abendblatt, 2019). Nowhere else in Schleswig-Holstein is as much construction underway as in Pinneberg County (Pinneberger Tageblatt, 2019: online).

Development of superordinate road traffic infrastructure

The expansion of autobahn BAB23 to achieve a total of six lanes between the Tornesch and Eidelstedt junctions (15 kilometres) is set out in the Federal Transport Infrastructure Plan 2030 and is categorised as a priority. The four-lane extension of the BAB7 is in progress and is expected to be accomplished by 2024.

Local transport planning

Both in Hamburg and in Pinneberg County there is currently a high level of planning dynamism in the PT sector, of which the current state of discussions is outlined here.

In 2019 the Hamburg-Takt (campaign for more efficient transport) was established as the new guiding principle for the development of PT in Hamburg. At the heart of this is the so-called "5-minute service promise", which aims to provide every Hamburg resident with a PT connection within 5 minutes (FH Hamburg_3).

In the rail transport sector, the range of services is being expanded to a significant extent. A feasibility study has been undertaken concerning the construction of the S32 line. The aim of the line is to provide public transport access to the densely populated areas in the west of Hamburg via Lurup, Osdorfer Born and the prospective Science City Bahrenfeld.

The U5 underground line (feasibility study has already been completed) also represents an important link between the Arenenen Volkspark and Siemersplatz stops.

Relocating the Altona main-line railway station to the current Diebsteich S-Bahn station (two kilometres north of the current Altona railway station) allows for easier and faster transfers for commuters travelling from the north with a destination in the city centre. There is, however, no longer a connection to the S1, which could lead to longer travel times on certain routes. Plans regarding bus connections to and from the new main-line station are not yet finalised.

As before, Hamburg Central Station remains the bottleneck in the transport system in the metropolitan region. Since all S-Bahn and U-Bahn lines must pass through the Central Station, increasing the interval frequency and the capacity by means of longer trains is only possible to a limited extent. Enak Ferlemann, Parliamentary State Secretary at the Federal Ministry of Transport, Building and Urban Development, introduced the possibility of a tunnel solution to increase capacity.

The Bus Acceleration Programme of the Free and Hanseatic City of Hamburg, which is currently ongoing, aims to achieve greater bus reliability and thereby increase their attractiveness in the transport system.

By introducing express buses, a new product has been created in the bus sector, which is intended to provide faster connections between areas that are not served by the regional rail network (e.g. line X3) and the city centre, but also to provide tangential connections.

In Hamburg, buses travel in mixed traffic on most routes, which makes them susceptible to delays despite being given priority at intersections.

The 5th Regional Local Transport Plan (2020–2024), which is currently being compiled in Pinneberg County, envisions an expansion of the regional rail passenger transport services, although this will fall under the responsibility of the state of Schleswig-Holstein:

- extend RE/RB stops in Tornesch to 4 per hour,
- AKN 1/3 60-minute intervals on weekend nights,
- S1 10-minute intervals throughout the entire day,
- S3 10-minute intervals on Saturdays after 15:00,
- 3rd track between Pinneberg and Elmshorn (high urgency)
- S4 West to Elmshorn (possibly extension Tornesch-Uetersen),
- S21 North extension to Kaltenkirchen,
- S32 to Schenefeld.

Another aim is to expand the bus service in terms of bus lines (including express bus lines), more night bus lines over the weekend and more frequent intervals. On-demand transport is being discussed as a supplementary means of public transport in areas and during times of low demand (e.g. region of Barmstedt, Tornesch). In this context, it is important to note that these on-demand services are coordinated with the intervals of the PT system.

Promoting the use of bicycles

Planning in the area of cycling and the expansion of the cycling infrastructure has been significantly increased in recent years. Specific bicycle traffic concepts have been developed in Hamburg and in Pinneberg County. A feasibility study for an expressway for cyclists between Elmshorn and Hamburg (connection Veloroute 2) is currently underway and should be completed by the end of 2020. Additionally, several municipalities in Pinneberg County are planning to expand their municipal cycling routes. For instance, the cities of Uetersen and Tornesch are planning to connect the two areas by means of a cycling route, which has great potential as an access link for public transport. As a whole, there is great potential for the expansion of municipal routes, especially in their function as feeder roads for express cycle routes and to bring commuters to regional rail stops. At the Hamburg city level, plans to promote cycling are grouped together in the Alliance for Cycling and are coordinated at all levels of government. Consequently, the alliance's objectives also form the basis for the achievement of other plans (Noise Action Plan, Hamburg Climate Plan, etc.). The central goal is to increase the share of bicycle traffic in the total traffic volume to 25% and even up to 30% in the 2020s.

Survey

Since commuters - as per the official definition - cross a municipal border, the statistics include both incoming and outgoing commuters for the whole of Hamburg. Thus, while a fairly accurate picture of commuter relations for the municipalities in Pinneberg County can be obtained, this picture becomes somewhat blurred as soon as

Hamburg's urban area is reached. At best, it is only possible to estimate where people commute to within Hamburg on the basis of workplace density and traffic volume. Through an online survey carried out as part of the SUMBA project, the mobility behaviour and patterns of commuters in Pinneberg County can for the first time be presented in a manner that is specific to the region. In the process, areas with motorised private transport (MPT) and public transport (PT) connections can be clearly identified. Areas with an affinity to MPT are areas where more people live who commute by car. On the other hand, in areas with a high level of public transport accessibility there are more people who commute to Hamburg by means of local transport.[9]

Survey method

The commuter survey for Pinneberg County was carried out as a standardised online survey during the period from 21 Nov to 12 Dec 2019. Altogether about 1,800 people took part in the survey. 1,496 questionnaires were used for the evaluation, as they were completed in full.[10]

Invitations to take part in the survey were distributed in the form of banners, picture ads or short videos via various digital channels. By making use of "geofencing", it was ensured that only residents from Pinneberg were addressed. Depending on user behaviour, the invitation was placed via interfaces on social networks, apps or articles published in online media. The local press also reported on the survey.

The survey was aimed at people who live in Pinneberg County and who work in Hamburg.[11] For the purpose of determining the spatial distribution of commuter flows in Hamburg's urban area, only incoming commuters to Hamburg were taken into account, but not outgoing commuters from Hamburg or commuters to the wider region.[12]

The questionnaire (refer to the attachment) consists of 22 questions with closed and open answer categories. The questions asked included the place of residence and work, choice of transport mode, travel time, distance between home and work, services provided by the employer and membership of the *Pendlerportal* (commuter portal) initiative. Individual criteria influencing changes in mobility behaviour were also surveyed.

This was supplemented by two qualitative on-site surveys in November and December 2019 in Elmshorn (Teppich Kibek GmbH's car park, Saturday, 23.11.2019, 10:00–15:00) and in Halstenbek (Roller furniture store's car park Saturday, 14.12.2019, 10:00–15:00). The aim of the on-site survey was to make use of a discussion guide to collect individual assessments regarding commuter behaviour and possible improvements in the transport infrastructure in terms of the mobility services provided. 39 people took part in the on-site surveys. The answers of these persons were qualitatively evaluated and were integrated into the evaluation in the form of quotes.

[9] The areas are defined on the basis of the traffic patterns of the people living there. This traffic behaviour is a consequence of the transport infrastructure available in the area as well as of personal and individual reasons.

[10] In comparison: In the context of the survey for the MID 2017 report, a total of 1,250 households selected according to specific criteria were surveyed in Pinneberg County.

[11] Commuter relations in the surrounding districts were not taken into account in the survey given the primary project design, but were to be examined in the context of a commuter master plan for the metropolitan region.

[12] The latter are already better represented through the statistics.

Sample description

Only people who reside in Pinneberg County and commute to Hamburg could participate in the survey. As such, they do not reflect the total population of the region or the daytime population of the Hanseatic city. They rather represent a section of the population: As a result, the panel is dominated by the 26 to 55-year-old age group. They account for 75% of the respondents in the survey versus only 30% of the total population. At 56%, the proportion of men is higher than the average male population share in Pinneberg County which amounts to 49.1% (Statistik Nord 2019_3: online).

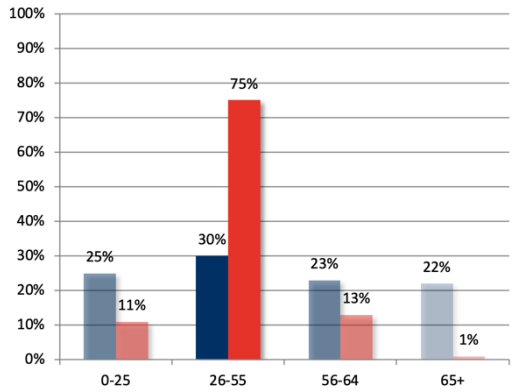


Figure 8. Age distribution of the respondents (red) in relation to the total number of inhabitants in Pinneberg County (blue)

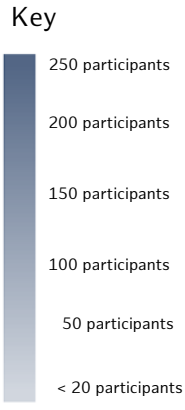


Figure 9. Respondents' places of residence

Place of residence and work

Nearly 70% of the respondents come from the large cities of Elmshorn, Pinneberg, Wedel, Tornesch and Uetersen (915 persons), and a good 30% from the smaller municipalities (579 persons). As such, the panel as a whole reflects the approximate spatial distribution of the population in the entire County.

The place of work was identified according to Hamburg Boroughs:

- 21% of the respondents work in the Altona region (mainly Bahrenfeld, Altstadt, Ottensen).
- 42% of the respondents work in Hamburg-Mitte (Hamburg-Altstadt, HafenCity, Hammerbrook, Finkenwerder).
- 37% of the respondents work in other Boroughs, mainly Eimsbüttel (Stellingen/Eidelstedt, Rotherbaum) and Hamburg-Nord.

Apart from the expanded city centre, the Schnackenburgallee commercial zone (Bahrenfeld/Stellingen/Eidelstedt), which spans several Boroughs, is also an important target location. City Nord and Fuhlsbüttel airport play a role for the incoming commuter traffic from Pinneberg County. It should be pointed out that people from Pinneberg County commute as far as Airbus in Finkenwerder. The location is geographically close, but can only be reached over long distances because of the Elbe (Finkenwerder ferry dock or the Elbe tunnel).

Workplace density of the respondents according to urban districts

Figure 10. Workplace density of the respondents in Hamburg according to urban districts

Commuting distances and times

At 32 kilometres, the average commuting distance for both motorised private transport and public transport is high. By contrast, the average commuting distance in Germany is 16.8 kilometres. Commuting distances of 30 kilometres are well above average and affect only 20% of all employees in Germany. The average travelling time to work is 46 minutes, whereby MPT users travel an average of 38 minutes and PT users 54 minutes. By way of contrast, the average travelling time in Germany is 20 minutes (Federal Statistical Office, 2017: online).

32 km

Average commuting distance

46 min

Average travelling time

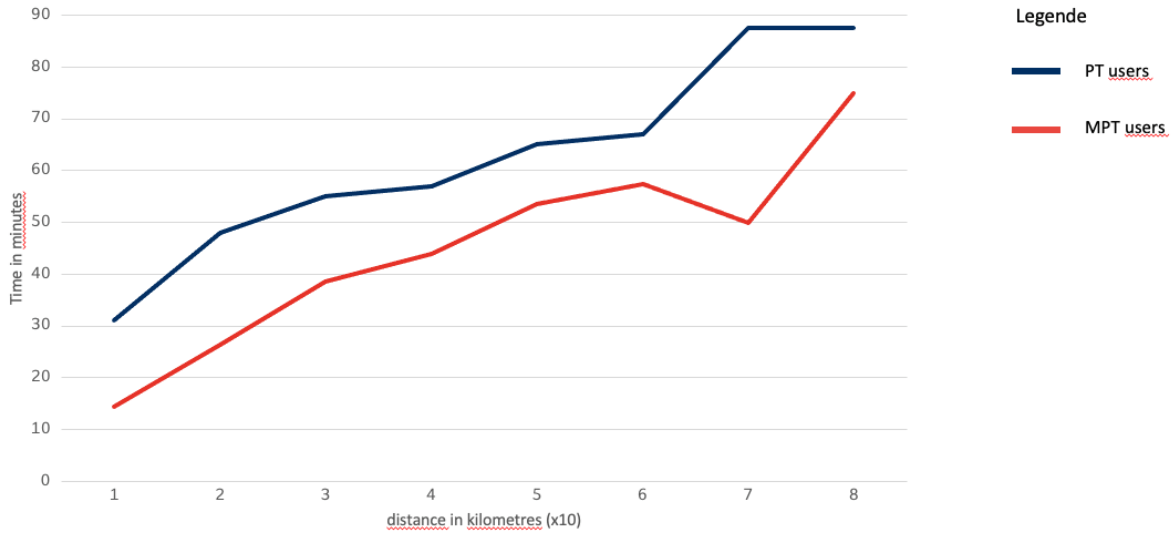


Figure 11. Choice of transport mode combined with the commuting distance and average travelling time

Quality of the commuter services

The commuter services are susceptible to interferences. 88% of the respondents indicate that their commute to work is delayed by more than 10 minutes every day or several times a week due to the traffic situation. As a result, 40% consider their commute to work to be somewhat stressful, 44% even consider it to be stressful frequently or almost always.

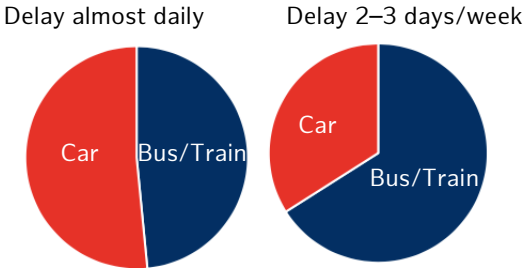


Figure 12. Comparison of the frequency of delays bus/train (blue) and car (red), single response

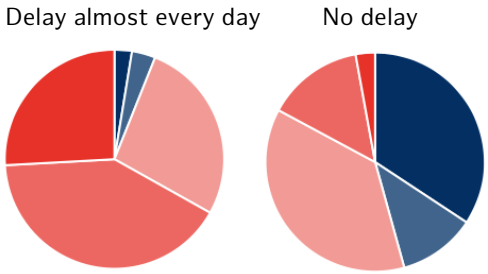


Figure 13. Perception of the commute to work subject to delays

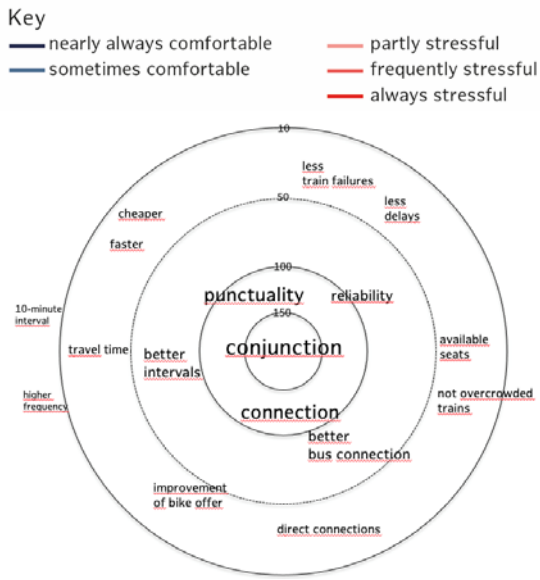


Figure 15. Conditions for changing from a private car to another mode of transport

88% of the respondents experience a delay of at least 10 minutes several times a week on their way to work

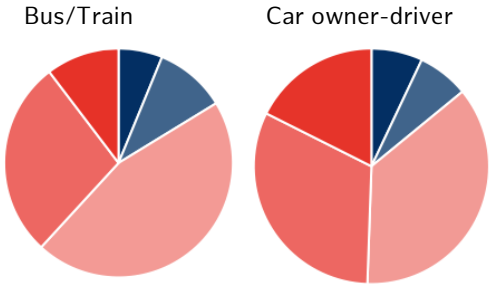


Figure 16. Perception of the commute to work subject to the choice of transport

38% of PT users often or always find their commute to work stressful.

49% of MPT users often/always feel that their commute to work is stressful. The following reasons were stated for the delays:

<u>PT use</u>

- Unreliable timetables
- Unreliable connections
- Overcrowded trains without a seat

<u>Car use</u>

- Traffic jams
- Looking for a parking space

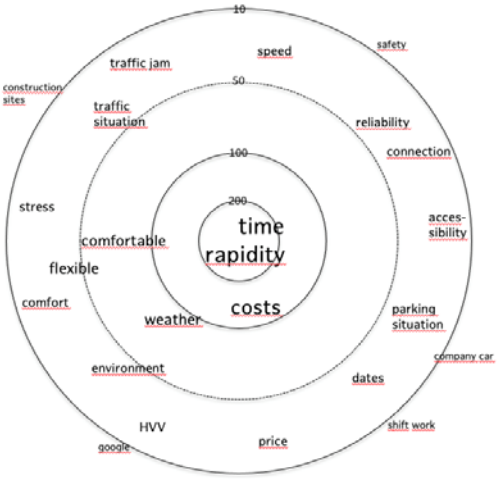


Figure 14. Criteria for choosing a mode of transport

Different modes of transport for different areas

The regionally differentiated representation of commuter traffic (Fig. 16) shows that public transport use is highest in the area served by railway lines (blue). Here, up to 60% and at peak times as much as 80% of commuting journeys are made using public transport.

On the other hand, areas such as Barmstedt and Quickborn have a low proportion of public transport (red) despite being connected to the regional rail network. It is reasonable to assume that the lack of a continuous PT connection leads to disproportionate travel time losses in comparison to MPT.

The MPT share increases as the distance to the railway lines increases and as the interval frequencies of the PT decrease.

About 70% of the inhabitants of the County live in municipalities with a high degree of PT, and about 30% of inhabitants live in municipalities with an affinity for MPT.

Additionally, choosing a mode of transport is closely tied to how easily the workplace can be reached by PT (cf. Figure 17). The more widely dispersed the workplaces are, the more MPT dominates on commuter routes (blue); the more central the workplaces are located along the S-Bahn city train axis, the more PT dominates (red).

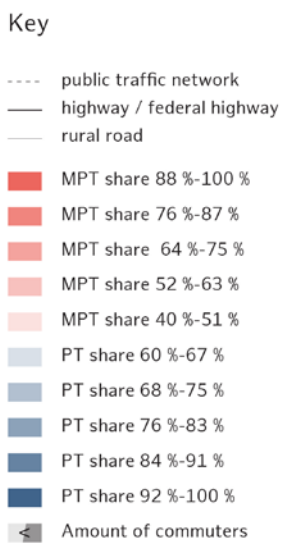


Figure 17. The dominant modes of commuter transport (used daily and several times a week), differentiated by settlement zones

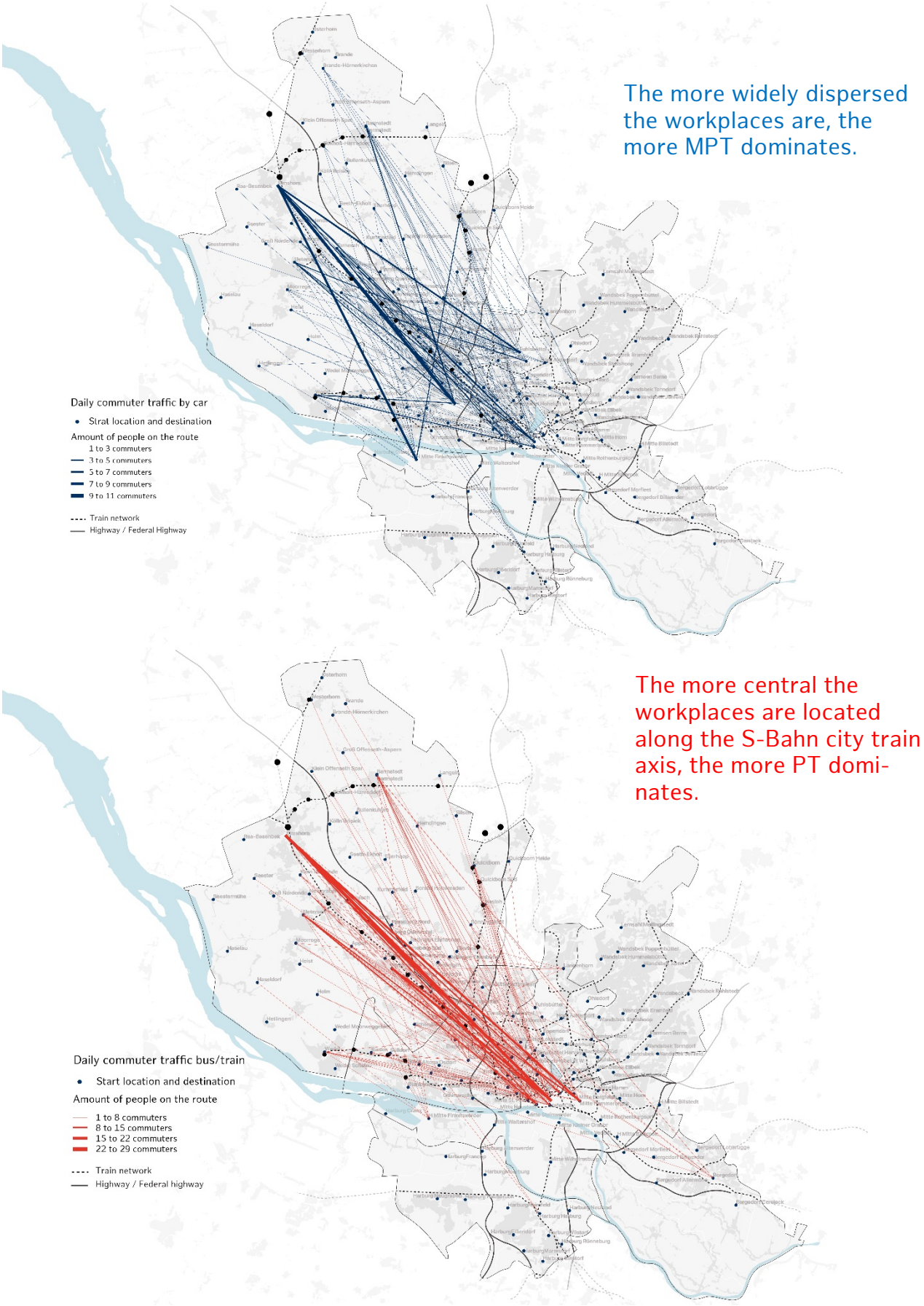


Figure 18. Choice of mode of transport relative to the location of the workplace, MPT (blue), PT (red)

Different combination of transportation modes for different areas

The focal points of intermodality differ throughout the study area. In the compact cities equipped with S-Bahn connections, the S-Bahn is used as the only means of transport for commuting to work more than is the case in other places. In the more distant and spacious locations, the combination of travelling by bicycle as well as by train is becoming increasingly important.

In areas that are not as well served by public transport, e.g. in Uetersen (buses take commuters to the train in intervals of more than 60 minutes), commuters tend to use their cars and the P+R services. Consequently, the P+R facilities - especially in Elmshorn - are often already fully occupied in the early morning hours.[13]

Besides the high importance of intermodality consisting of car and train travel in Uetersen, the following can be observed: In general, commuters that take the train on a daily basis (PT being the main mode of transport) tend to make use of several different modes of transport for one journey, while daily car drivers tend to limit themselves to their cars.[14]

Legend for the use of transport modes (daily and several times a week)

- Intermodal use car and foot
- Monomodal use car
- Intermodal use bus/train and car
- Monomodal use bus/train
- Intermodal use bus/train and bicycle
- Intermodal use bus/train and foot

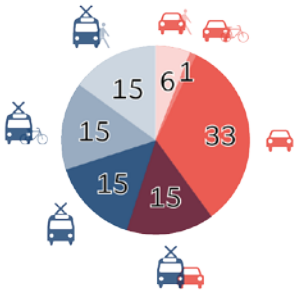


Figure 19. Choice of transport mode in Uetersen (in %)

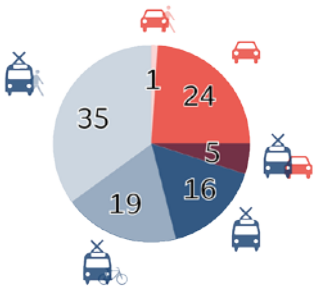


Figure 20. Choice of transport mode in Tornesch (in %)

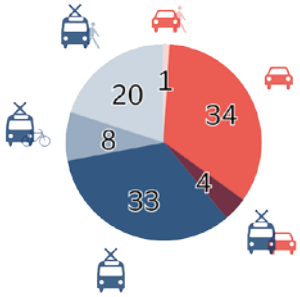


Figure 21. Choice of transport mode in Wedel (in %)

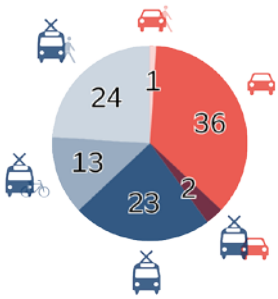


Figure 22. Choice of transport mode in Pinneberg (in %)

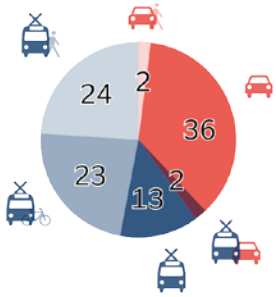


Figure 23. Choice of transport mode in Elmshorn (in %)

[13] Information obtained from the on-site surveys

[14] The distance covered on foot in the case of intermodal car/foot use was not surveyed.

Choice of transportation mode according to age

Different age groups choose different means of transport. Young people clearly use PT more often for their commute. In the 19-25 age group, the PT share is as high as 75%. With increasing age, the choice of transportation becomes more and more similar. Only 51% of 35- to 45-year-olds continue to make use of PT as their main mode of transport. It can be assumed that raising a family and mobility that is oriented towards children will contribute to an increase in the share of MPT.

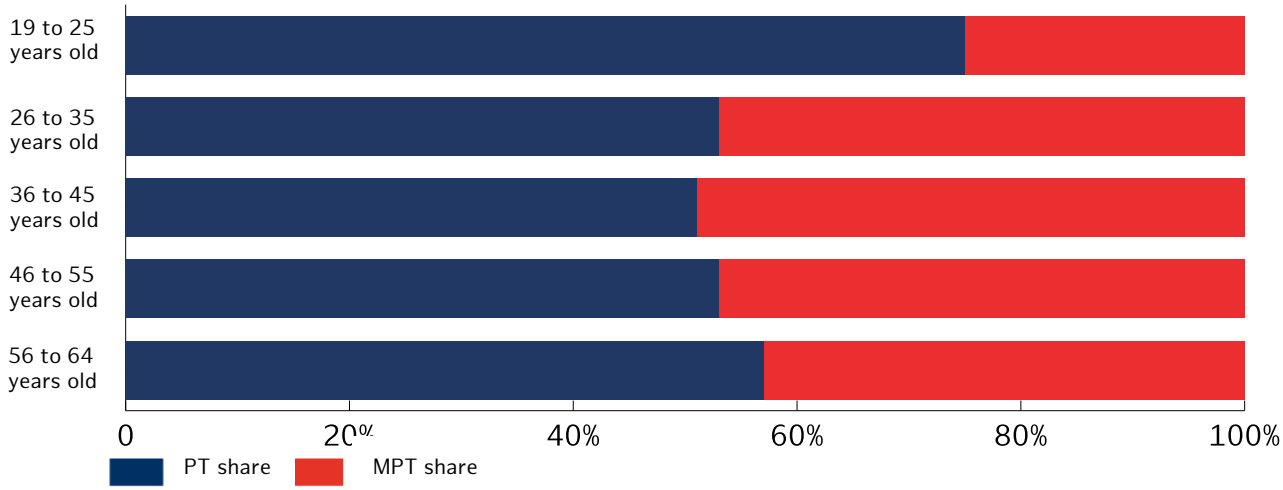


Figure 24. Choice of transportation mode depending on the age group

Significance of the transportation mode

Commuting by bus and train is deemed to be less stressful than commuting by car (cf. Figure 16). Even so, almost 20% of all respondents do not want to give up their own car.[15]

The main reasons for choosing to commute by car are as follows (listed according to the frequency of the responses):

- Time, reliability
- Comfort
- Cost/value for money ratio
- Weather conditions
- Availability
- Construction, congestion, train cancellations
- Company car, tax payments, external appointments

One reason for choosing PT as a transportation mode is the fact that there is no need to search for a parking spot at the workplace. Other reasons mentioned for using PT were environmental friendliness, the current traffic situation (congestion) and not owning a car.

[15] Car ownership was not surveyed

Temporal distribution of commuter traffic and flexibility of working hours

The morning rush hour is mainly concentrated between 6.00 and 8.00 and the afternoon commuter traffic is concentrated between 16.00 and 18.00.

38% of the respondents have fixed working hours, 59% of the respondents work flexitime or trust-based working hours and can adapt their commuting times to the traffic situation:

"I only leave for work at 9.30 in the morning to avoid being stuck in traffic. My son leaves at 6.00 in order to get a P+R spot in Elmshorn."

No reasons regarding lack of flexibility were surveyed, but may be due to other obligations, such as childcare (standard school starting time 8.00 am, afternoon childcare etc.).

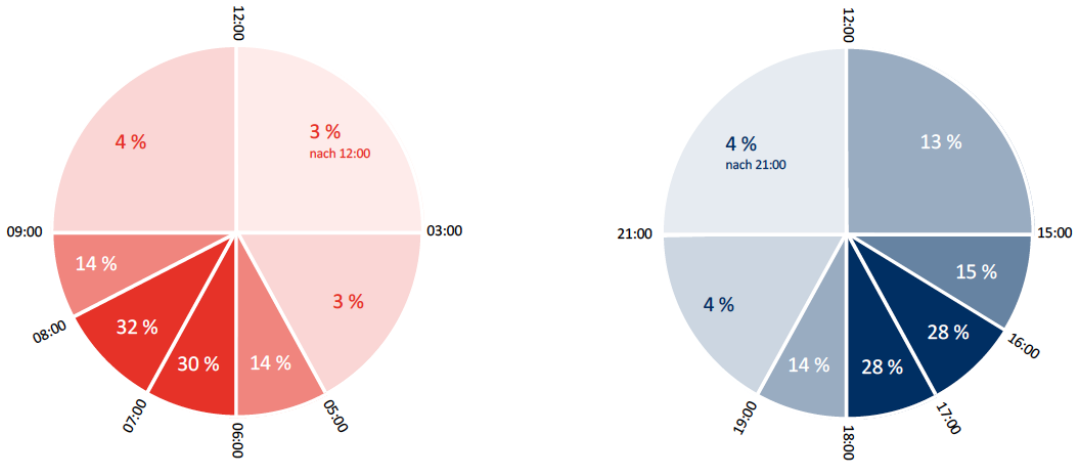


Figure 25. Starting time for the way there (left in red) and starting time for the way back (right in blue)

Framework conditions for choosing a mode of transport

Offers from employers

Around 80% of employers are making mobility-related offers to their employees. 53% of respondents are provided with so-called job tickets, while 32% are provided with an employee parking space. Nearly 20% of the respondents report that their workplace has bicycle parking facilities as well as showers for cyclists.

The choice of transport mode is influenced by the employer's mobility offers:

- **62%** of people with a **job ticket** sponsored by their employer make exclusive use of public transport.
- **63%** of people who have access to an **employee parking space** only travel to work by car.
- **70%** of people who have **company cars** at their disposal travel to work exclusively by car.

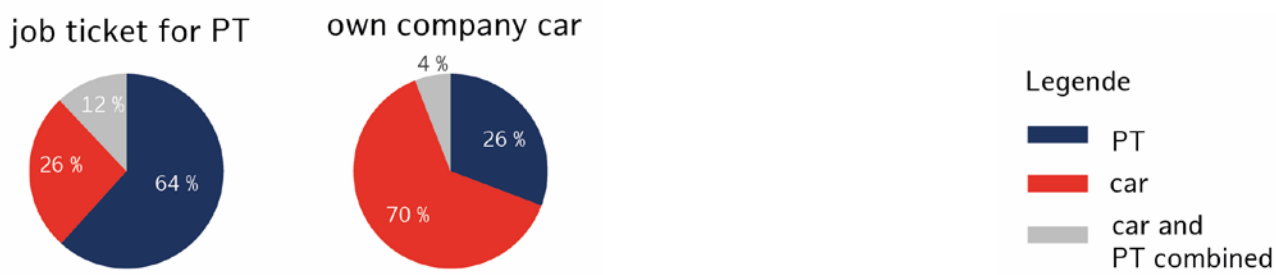


Figure 26. Choice of transportation mode depending on the employer's offers

Apps and digital information

"I use an app every day to check if and when the regional train or the S-Bahn departs from Pinneberg."

Many respondents believe that their choice of daily means of transport is influenced by up-to-date traffic information, such as by having a look on Google Maps or the HVV or DB apps. This emphasises how important real-time information is. These statements correspond with the results of the MiD study of 2017, which reveals that navigation systems for determining the current traffic situation are primarily used by people using multimodal transport or by motorists who use public transport to some extent (MiD 2107: online).

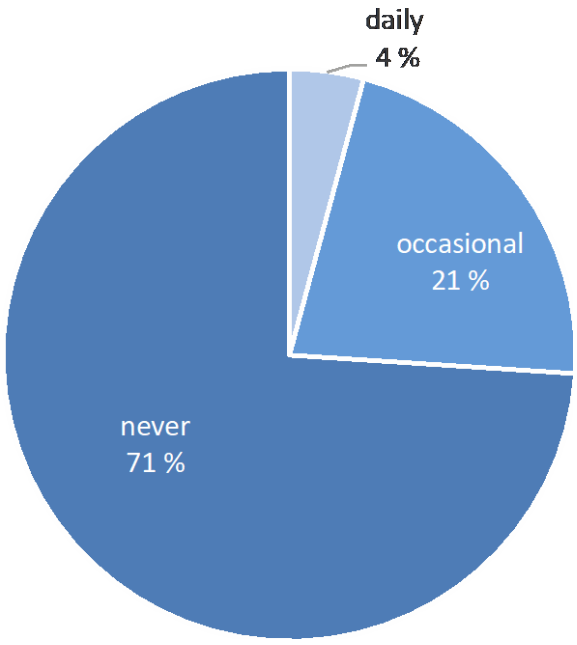


Figure 27. Carpooling to/from work

Commuter portals and carpooling

To date, carpooling has not had any significant impact on commuter traffic in Pinneberg County. Only 3% of the respondents are members on a commuter portal. Only 4% of the respondents carpool on a daily basis.

15% of the respondents occasionally pick up a person to work, 75% do not carpool at all.

As a result of flexible working hours and combined transportation chains, many respondents do not take another person to work in their cars.

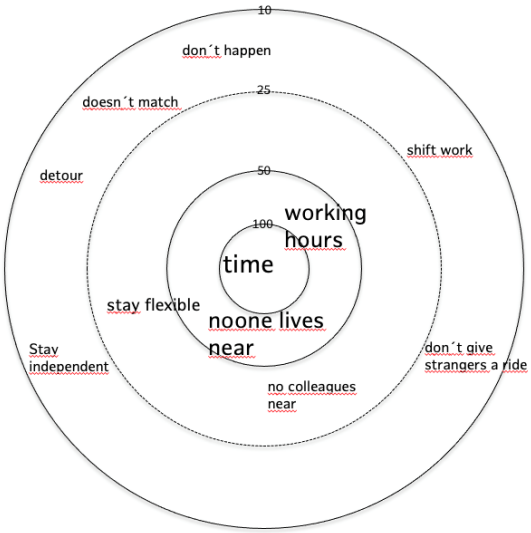


Figure 28. Reasons for not picking up other people on their commute

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"Carpools? I do not even know if there is anyone living in my area with whom I could travel."

"I don't pick anyone up when I take my husband to the train and drive my child to school. I would find that a bit too private. I would prefer to be alone with my family when travelling these routes."

Given that commuter portals as well as other networking platforms are not very widespread, there is often a lack of information on whether there are colleagues living nearby or whether people living in the same region share work routes and working hours. This assessment is consistent with the evaluation findings on the deployment of the *Pendlerportal* commuter portal in Pinneberg County. A commuter portal service alone does not result in commuters carpooling to a greater extent (MRH 2014).

Some respondents made suggestions for giving priority to carpooling in traffic, which could potentially lead to a reduction in travel time:

"Turn the emergency lanes into sharing lanes,
just like in America."

Alternative transportation modes from the respondents' point of view

One thing becomes very clear: The majority of commuters from Pinneberg County do not consider cycling to be a viable alternative for their commute to work. E-bikes, e-scooters and carpooling opportunities are also rarely used. Only 7% would consider a bicycle or e-bike to be an alternative. 20% of the respondents stated that they did not want to or could not change at all. For them the car is the only option.

However, 71% of the current MPT users see bus and train as a possible alternative to the car. At the same time, there is a clear condition attached to the switch: Trains and buses would have to run more reliably and punctually and the frequency of the regional trains would have to be increased. Only then could people truly believe a switch to PT to be possible.

"The train to Tornesch only departs every hour. For me, this is not a realistic alternative to the car. I cannot afford to miss the train."

Respondents also expressed their views on the tariff structure, which they felt was still unattractive. Besides the price jumps caused by the tariff limit, there were criticisms that smaller companies cannot provide their employees with ProfiTickets because this service of the HVV can only be claimed by 20 or more employees per company.

"For me, commuting by bus and train is too expensive. That only works if you have a ProfiTicket. So I only travel by train in winter."

"I would use public transport if Wrist were included in the HVV tariff. I do not want to pay the regular prices."[16]

71% **of the respondents can imagine using bus and train as an alternative to their own car.**

20% **of the respondents would not give up their own car**

7% **of the respondents can imagine using a bicycle and e-bike as an alternative to their own car.**

4% **of the respondents can imagine using an e-bike as an alternative to their own car.**

3% **of the respondents can imagine using a bicycle as an alternative to their own car.**

1% **of the respondents can imagine commuting as a passenger in a car to their work in Hamburg.**

Using e-scooters or walking to work does not constitute relevant alternatives for the respondents (0.6% and 0.4% of respondents respectively).

[16] HVV integration of the IZ County is currently being prepared by an expert opinion. Subject to the appropriate decisions, in particular by the state of Schleswig-Holstein (but also Hamburg) and the IZ County, it will be implemented at the earliest in 12/2021.

Comparison of travel times

In order to compare travel times, data on the source and destination locations of selected respondents were evaluated with the help of navigation systems. Rush hour traffic was used as a reference point. The routes were chosen in such a way as to cover different locations in the study area.

The timespans of MPT result from the traffic jam data taken into account; delays in PT could not be taken into account due to lack of data. The comparisons reveal that journeys can be made much faster by car than by PT and cycling. Longer travel times by PT especially arise when the destination is located at a greater distance from the city centre and it becomes necessary to make a transfer. Particularly transfers in peripheral areas sometimes require an hourly stopover.

The long commuting times associated with cycling are due to the fact that the survey only considered destinations in Hamburg, which means that the average commuting distance to work is 32 kilometres.

Intermodal connections were not taken into account when calculating travelling times.

Figure 29. Exemplary travel time comparisons based on the online survey

Stakeholder discussions

Stakeholder meetings were held with the institutions involved in the project in order to coordinate both the analysis and the measures envisaged. These discussions revealed a definite trend: A bus and train service that is attractive and reliable for commuters, with attractive intermodal connections for cycling and cars, is one of the most important climate protection measures in the transport sector. If PT is to be qualified and expanded, coordination at regional level must be improved to a significant degree so that any planning barriers are reduced and eliminated. To be able to develop savings potential in the short to medium term, smaller measures should be combined into climate-efficient "packages".

Group of participants

Representatives of Pinneberg County, the Borough of Altona Office, the HVV, the VHH, the DB, the Hochbahn and individual municipalities took part in the stakeholder meetings held at the beginning of 2020. Based on the preliminary results of the survey, the actual room for manoeuvre of the stakeholders was critically examined. Likewise, sustainable action areas were discussed and pre-evaluated.

A realistic perspective

All the experts consulted were in agreement: There is no doubt that it is necessary to expand the PT services and it has been repeatedly called for. They stress that the PT system, especially on the Elmshorn-Hamburg axis, is already heavily overburdened and has reached its capacity limits. Under such circumstances, it is not possible to simply increase the number of passengers. The PT system would first have to be strengthened and qualified in order to keep existing passengers comfortable and secure. To accommodate more passengers in large numbers, a comprehensive expansion will be required.

Apart from strengthening the radial connections, tangential PT connections would have to be expanded in keeping with the changing patterns in commuter traffic, e.g. through new bus lines or the addition of express bus lines to existing lines along with the corresponding prioritisation measures.

Practical implementation problems

Actual expansion of the PT system is rather difficult in practice. Technical, legal and structural aspects are particularly prominent in this regard. The discussion partners point out, for example, that in order to expand the existing regional rail passenger transport, it would first be necessary to heavily invest in the rail network (rails, signal boxes). Apart from the "bottleneck" at the main station, other stops cannot be easily extended to accommodate full trains either, e.g. due to the protection of historical monuments. The double-track extension of the S1 line between Blankenese and Wedel has come to a standstill, in part due to the numerous unresolved land issues in the area where the tramline is to be laid.

Regional coordination as a prerequisite

From the point of view of the respondents, successful implementation is closely linked to the establishment of a superordinate and coordinating planning institution, e.g. for coordinating new mobility services or planning the regional rail passenger transport. Neither the HVV nor the metropolitan region could have a suitable work assignment. Good coordination between the two federal states in the regional rail network and between Pinneberg County and the

Hanseatic City of Hamburg in the LPT sector is indispensable:

- The states of Hamburg and Schleswig-Holstein operate different transportation models; the metropolitan region cannot be represented by one transportation model. The Hamburg transport model only encompasses some parts of the surrounding area.
- The HVV is only an association and not a superordinate body responsible for implementing any measures. When it comes to the implementation of the measures, it is dependent on the collaboration with the other stakeholders.
- The Hamburg Bus Acceleration Programme ends at the city limits, but it could be extended to Pinneberg County, not least in order to avoid a congestion of terminal stops at the city limits and also to respond to the functional criteria and the needs of the people.

Many stakeholders were not yet aware of the emerging municipal cooperations across federal states, especially the neighbourhood forum, but they were very interested in these developments. The overall feeling was that these initiatives should be strengthened and further developed.

PT as a key measure

The respondents expressed their support for pushing ahead with an expansion of the PT system, which is effective but can only be implemented in the long term, and for improving the framework conditions.

Combining the accompanying measures

In the meantime, coordinated short- to medium-term measures could ensure partial success:

- The "city of short distances" or "compact city" urban planning concept can play an important role in reducing and managing commuter traffic. As part of *Transit-Oriented Development*, residential construction and employment-intensive commercial or mixed-use areas should be concentrated along existing and new PT routes.
- Through the coordination and continuation of the planned bus lanes into the surrounding region as part of the Hamburg Bus Acceleration Programme, the representatives from HVV, VHH and Pinneberg County see opportunities for a relatively short-term improvement of the PT services. This could, from Hamburg's point of view, also solve problems related to the congestion of terminal stops at the city limits.
- In principle, the PT schedules and intervals of Hamburg and Schleswig-Holstein should be coordinated to ensure that transfers can be organised with minimum loss of time.
- P+R and B+R facilities should be expanded even further. At up to 90%, the facilities in Pinneberg and Tornesch are heavily utilised. On top of this, existing stations exhibit structural and architectural shortcomings as well as functional weaknesses that reduce their attractiveness. Stations and transfer points must be designed so as to be inviting.
- The concept of P+P spaces (parking + pooling) at highway access points was discussed positively. To date there is one officially designated site in Tornesch. A few experts pointed out that some commuters also make informal use of suitable areas. For this reason, more areas should be designated. In this context, it could also be worth considering continuing bus connections.
- A reallocation of the road space was discussed. Experiences with combined lanes for bus and bicycle traffic should be evaluated and further developed in terms of concept. It should also be considered whether lane allocation during peak hours should be made more dynamic by means of guidance systems so buses in particular can travel more quickly. The city of Elmshorn suggested that apart from the extension of the

express cycle routes, greater attention should also be paid to expanding cycle paths within the communities, especially to railway stations and B+R facilities.

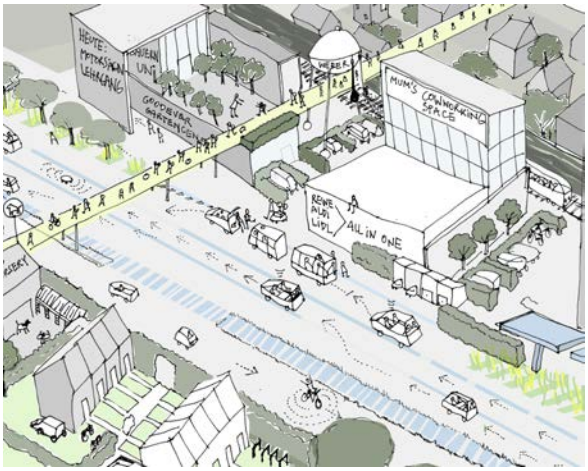


Figure 30. Dynamic allocation of the road. Based on the peaks, the lanes per direction are adapted in response to the volume of traffic. A separate lane with possibilities for stopping will be opened up for the general traffic (orange edge for the Hamburger Bauforum Magistralen).

– The management of new residents and their mobility could contribute to changing mobility behaviour if implemented on a larger scale. The HVV and Hochbahn are currently in the process of preparing a project. Mobility management for the Schnackenburgallee commercial area is being discussed.
- The Swedish SUMBA partner city Växjö has established a “bicycle library” as part of the project. Here it would be necessary to determine whether this can be transferred to the commuter situation in the study area.

New developments, such as needs-based on-demand services, are perceived rather sceptically by the stakeholders, as their capacities cannot yet be predicted. Fundamentally, however, innovations and new approaches to solutions should be explored.

Figure 31. Idea sketch for a dynamic P&R guidance system on the A23

Conceptual preliminary considerations

SWOT analysis

As part of drawing up and developing the concept, a SWOT analysis was carried out together with the SUMBA group of experts, which was supplemented throughout the course of reviewing the current situation and conducting the survey as well as with the outcomes of the stakeholder discussions. The results are summarised in Fig. 32 by way of an overview.

Strengths	Weaknesses	Opportunities	Threats
Concepts and plans for the further development of the PT system already exist and are backed up with appropriate resources for their implementation.	Lack of comprehensive, binding regional planning for the area of study.	Bottom-up initiatives assist in coordinating local activities across state borders.	Decentralised administrative structures impede the establishment of a regional planning institution.
For the most part, the transportation system is reliable and in good condition with regular maintenance.	(Currently) no transport development plan available (to be completed in 2022).	Management of parking space, lower speed limits and restrictions on the number of cars allowed to pass through make the use of private cars less attractive.	A growing population means that the transport system will continue to experience pressure, especially during peak hours.
With the HVV, public transport is processed through a single brand, customer satisfaction is high.	Cross-border planning processes make administrative borders clearly visible.	The influx of new population groups presents potential for new PT customers.	Changes in demographics (ageing population, diversification) are changing mobility needs.
The HVV is open to innovation and various new services are being trialled.	Expanding the regional rail network (especially new lines) is a lengthy process that involves a complex planning and high investments.	Densification of the city generates good conditions for the use of PT and cycling (city of short distances).	Lack of cooperation between institutions (at the administrative level but also with regard to the integration of new mobility services in the HVV).
Intermodal services such as B+R facilities and sharing services (Switchh, StadtRAD city bike) are being expanded and developed.	The rail infrastructure limits capacity expansions through the use of longer trains and/or increased frequencies of trains (single-track S1, bottleneck main station).	New regional rail lines increase the capacity and attractiveness of PT (long-term investment).	Implementation of the residential construction programme and redensification will result in increased traffic volumes.
The possibility of (free) bicycle transport promotes intermodal transport behaviour.	Prioritisation of buses is not implemented across the board and could be pursued more consistently.	Working hours that are more diversified and flexible can lead to a better distribution of traffic throughout the day. An increase in the incidence of home	Lack of political will to enforce environmental legislation.

		offices can reduce commuter traffic.	
The tariff association ensures convenient, simple use of PT throughout the entire study area.	Making the use of P+R spaces subject to charges increases the total cost of the journey and reduces its attractiveness.	Stagnating car ownership rate in Hamburg/ Altona (Statistik Nord 2017).[17]	
	By further expanding the road system, the time-saving advantage of MPT will remain.		

Figure 32. SWOT analysis (Illustration of the Altona region)

Overarching trends

A number of overarching trends are influencing the development of the transport system, some of which are briefly outlined below.

With regard to **settlement development**, a continuing growth of the metropolitan areas can be observed, whereby several different trends are taking place in parallel: With property prices continuing to rise, people are moving away from the inner city to the outskirts of the city or to the surrounding area, thus willing to accept longer commuting distances. At the same time, however, many people are moving into inner city areas with the density of construction increasing. According to calculations by the Statistical Office of Northern Germany (Statistikamt Nord), Hamburg's population will grow from 1.83 million inhabitants in 2017 to an estimated 2.05 million inhabitants in 2040 (Statistik Nord 2019_4). The shares of young and old population groups are growing at a proportionately higher rate, with a smaller share of the population being of working age. For Pinneberg County, a population growth of nearly 300,000 inhabitants (2012) to approximately 303,500 inhabitants by 2030 is projected, with the strongest growth expected around the Altona-Pinneberg-Elmshorn axis. In addition, due to an increasing share of one- and two-person households, the demand for housing is also expected to rise (Kreis Pinneberg website 2014). The experiences gathered during the Covid-19 pandemic and especially during the "first wave" and the "shutdown" from March 2020 could further reinforce suburbanisation, as more people attach greater importance to their own garden than to their personal space.

Business is affected by suburbanisation as well. Settling businesses in the surrounding area can lead to shorter commuting distances, but also to an increase in commuter traffic. Either way, the transportation chains will become more spread, something that can already be observed at present.

Designing new residential and mixed-use neighbourhoods so as to reduce the number of cars can contribute to the modal shift towards environmentally friendly transportation (Blechschmidt 2016). The widespread elimination of parking space entitlement for residential property in Hamburg has increased the room for manoeuvre in this area. Apart from making attractive mobility offers available, the practical implementation of a car-free system or car reduction concept must be ensured, e.g. through regularly monitoring parking spaces in public areas. Up to now, little has been done in terms of redesigning existing

[17] From 332 cars per 1000 inhabitants in 2012 to 327 cars per 1000 inhabitants in 2017 (Altona), from 340 cars per 1000 inhabitants in 2012 to 334 cars per 1000 inhabitants in 2017 in Hamburg.

neighbourhoods in a way that does not involve the use of cars. With the planned redesign of parts of Ottensen as a low-traffic district subsequent to the 2019 traffic project "Ottensen macht Platz" ("Ottensen is making space"), more experience will be gained in this area over the next few years.

Digitalisation brings with it a number of changes that have an impact on the transport system. On the one hand, these involve the transport system as such, with the increasing networking of different modes of transport, and it is only through such digitalisation that sharing offers can be widely used. Work is currently underway in Hamburg to digitalise the S-Bahn, with a first section (Berliner Tor - Bergedorf) to be ready by 2021. Here, digitalisation enables an operation that is less susceptible to disruptions as well as closer time intervals between trains. The "hvv switchh" app represents an initial step towards a booking platform involving different modes of transport, comprising new mobility offers in addition to traditional LPT with MOIA. To be able to make use of the full potential of sharing offers, it is necessary to expand into less densely populated areas. Additionally, the (data) network expansion must meet the relevant requirements across the whole area. In future, matters such as the use of autonomous vehicles in road traffic will require corresponding data infrastructure on the one hand, and on the other hand it will introduce yet another aspect into the discussion on the reallocation of road space.

Advancing digitalisation is also reflected in changes in transport services. Rather than pure transportation infrastructure, more and more mobility services are being offered and new collaborations between "traditional" transport companies and private providers are emerging.

Another point to consider is that digitalisation is making changes in the **workplace** possible: in many areas, being physically present at the workplace is at least partially redundant, and in many sectors it is making working models more flexible.

Balancing working hours is to be seen as beneficial for the transport system, since spikes in demand during peak hours are reduced, while there may be a better utilisation rate during off-peak hours. An equalisation of the evening rush hour traffic can already be observed, whereas the morning rush hour peak remains more or less constant.

As a result of **demographic developments**, the proportion of passive transport users has increased and the distinction between "mobile" and "immobile" population groups has become more pronounced. This means that issues such as the barrier-free design of transport systems and public space are gaining in importance.

Most recently, the experience acquired in the context of the Covid-19 pandemic has given the development of more flexible work in terms of space and time a significant boost. Current studies suggest that working from home offices, at least in part, is here to stay (DLR 2020). On the one hand, this confronts the LPT system with the challenge of responding to more flexible demand, especially with regard to the tariff structure. On the other hand, the possibility of working from home can make moving out of the city and into the surrounding area more attractive for people and thus promote further suburbanisation.

The consequences of the Covid-19 pandemic are serious and far-reaching in many respects, the scale and duration of which are not yet fully predictable. Besides the increased flexibility in terms of employment, an increased use of individual transportation modes can be observed. This is reflected in an increased cycling proportion, but private cars are also more frequently chosen as an alternative to LPT, which is perceived as being less safe under pandemic conditions. This is expected to especially affect commuters with longer commuting distances. Strategies need to be developed as to how this trend can be reversed.

The economic consequences of the pandemic will only gradually become apparent. Recession and unemployment can have a significant impact on the framework conditions, particularly in terms of the investment volumes of the public sector.

Conclusions and recommendations

The study clearly identifies a differentiation in commuter mobility behaviour. The traffic commuting to Hamburg continues to play the central role. But the regional commuter traffic is becoming more diverse, leading more often to the region and to places that are not directly connected by public transport. Conducting interviews among commuters in Pinneberg County with a destination in Hamburg reveals the long distances people travel in their everyday lives. The working population is unable to find affordable or adequate housing in the city and is relocating to the surrounding area. Even large companies that require a lot of space are following the trend towards suburbanisation. Added to this is the progressive densification of the inner city area.

The development of transport infrastructure - whether road or rail - is lagging behind the dynamic demographic development. Both systems are currently heavily overburdened. It remains to be seen how the situation will develop once the major transport infrastructure projects (expansion of the highway, extension of the S-Bahn and U-Bahn) have been implemented. The survey also clearly indicates that the vast majority of people are prepared to make use of efficient and attractive local and regional public transport for their journey to work.

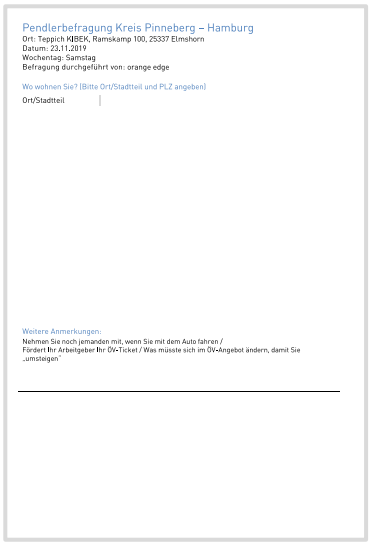
In the study area, the bicycle plays a particularly important role as a means of reaching PT stops, although there is potential for longer distances with electric support as well.

The experts who are involved clearly advocate a qualification and expansion of the public transport system. At the same time, they point out that especially the measures that are urgently needed in the regional rail network can currently only be realised in the long term and are made more difficult by administrative and legal complexities, be they inconsistent transport models, fragmented responsibilities and funding opportunities or even inconsistent planning time frames. Before any expansion work can be undertaken, it is also necessary to invest in outdated technology (signal boxes), which further complicates the process.

The study pre-evaluated a number of different strategic approaches. These include optimisation and development of high-quality transfer points, the creation of new cycling infrastructure specifically designed to meet the needs of commuters, as well as strengthening and promoting new mobility services (sharing, pooling, shuttle). If the climate targets and Hamburg's target of 80% environmental integration in the modal split are to be achieved, it will be necessary not only to expand public transport services and cycling infrastructure but also to take restrictive measures in the area of MPT. However, in the course of the study these measures were only considered in passing.

Appendix

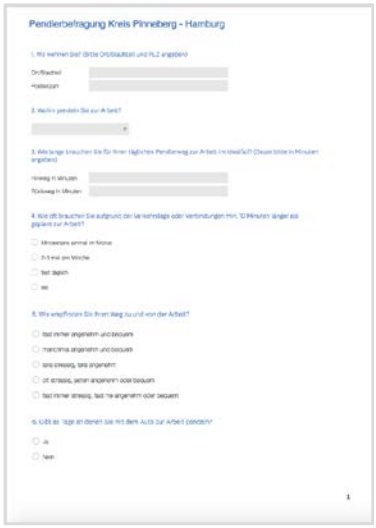
Questionnaire off-line survey



Pendlerbefragung Kreis Pinneberg – Hamburg
Ort: Teppich KIBEK, Ramskamp 100, 25337 Elmshorn
Datum: 23.11.2019
Wochentag: Samstag
Befragung durchgeführt von: orange edge

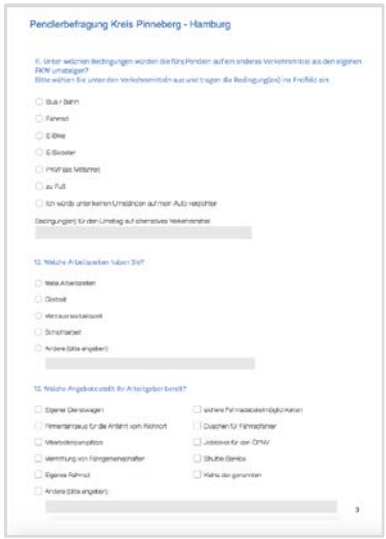
Wo wohnen Sie? (Bitte Ort/Stadtteil und PLZ angeben)
Ort/Stadtteil

Weitere Anmerkungen:
Nehmen Sie noch jemanden mit, wenn Sie mit dem Auto fahren /
Fördert Ihr Arbeitgeber Ihr ÖV-Ticket / Was müsste sich im ÖV-Angebot ändern, damit Sie „umsteigen"

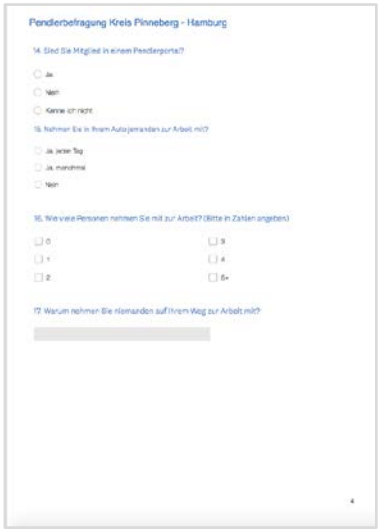


Pendlerbefragung Kreis Pinneberg - Hamburg

Pendlerbefragung Kreis Pinneberg - Hamburg



Pendlerbefragung Kreis Pinneberg - Hamburg



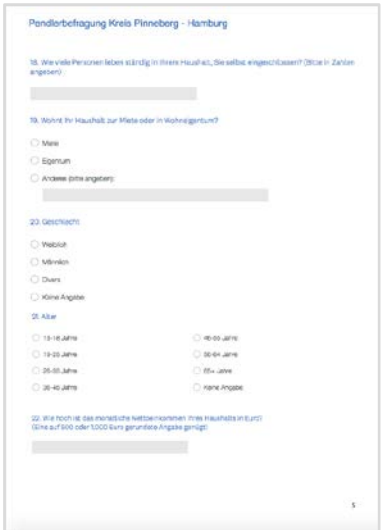
Pendlerbefragung Kreis Pinneberg - Hamburg

14. Sind Sie Mitglied in einem Pendlerportal?
Ja
Nein
Kenne ich nicht

15. Nehmen Sie in Ihrem Auto jemanden zur Arbeit mit?
Ja, jeden Tag
Ja, manchmal
Nein

16. Wie viele Personen nehmen Sie mit zur Arbeit? (Bitte in Zahlen angeben)
0
1
2
3
4
5+

17. Warum nehmen Sie niemanden auf Ihrem Weg zur Arbeit mit?



Pendlerbefragung Kreis Pinneberg - Hamburg

18. Wie viele Personen leben ständig in Ihrem Haushalt, Sie selbst eingeschlossen? (Bitte in Zahlen angeben)

19. Wohnt Ihr Haushalt zur Miete oder in Wohneigentum?
Miete
Eigentum
Andere (bitte angeben)

20. Geschlecht
Weiblich
Männlich
Divers
Keine Angabe

21. Alter
13-18 Jahre
19-25 Jahre
26-35 Jahre
36-45 Jahre
46-55 Jahre
56-64 Jahre
65+ Jahre
Keine Angabe

22. Wie hoch ist das monatliche Nettoeinkommen Ihres Haushalts in Euro?
(Eine auf 500 oder 1.000 Euro gerundete Angabe genügt)

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List of figures

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List of abbreviations

BauGB – Federal Building Code (German: Baugesetzbuch)

B+R – bike and ride

BUE – Ministry of Environment and Energy (German: Behörde für Umwelt und Energie)

CO_2 – Carbon dioxide

DB – (German Rail) Deutsche Bahn

ADT – average daily traffic

EU – European Union

FSTrG – Federal Highway Act (German: Bundesfernstraßengesetz)

HVV – Hamburg Transport Association (German: Hamburger Verkehrsverbund)

RH – rush hour

IZ – Itzehoe

MiD – Mobility in Germany (Mobilität in Deutschland)

min – minutes

Motor vehicle – power-driven vehicle

Km/h – kilometres per hour

MPT - motorised private transport

min – minutes

MRH – Hamburg Metropolitan Region

OECD - Organisation for Economic Co-operation and Development

LPT – local public transport

PT – public transport

Car – passenger car

P+P – park and pool

P+R – park and ride

SH – Schleswig-Holstein

RRPT - regional rail passenger transport

SUMBA – Sustainable urban mobility and commuting in Baltic cities

SWOT – acronym for: Strengths, Weaknesses, Opportunities and Threats

VHH – Public Transport Services Hamburg-Holstein