Sustainable mobility
in housing

**Mobility hubs at
Münchner Wohnen**

Sustainable Mobility in Housing – A Best Practice Guide for the National Cycling Plan 3.0

The National Cycling Plan 3.0 (NCP, or NRVP in German) is the Federal Government's strategy for promoting cycling for society as a whole in Germany for the period up to 2030. The overarching goal of the NCP is to make cycling in Germany more attractive and safer and to significantly increase the number of kilometres travelled by bicycle.
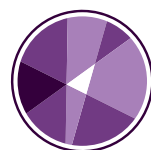
Within the NCP, four pillars of cycling promotion are defined: "Policy", "Infrastructure", "People" and "Economy" as well as the two cross-sectional areas of "Digitalisation" and "Town and Country".[1]

This best practice guide for sustainable mobility in housing makes a relevant contribution to the implementation of the National Cycling Plan 3.0:

- It serves as a comprehensive communication measure to spread a cycling culture and to promote social change.

- The implementation of bicycle-based mobility hubs close to residential areas directly reduces motor vehicle traffic by encouraging more cycling and thus contributes to national climate and environmental protection goals.

- The mobility hub should be seen as a contribution to bike-friendly residential areas and liveable public spaces, because alternative mobility services such as bike sharing are suitable for reducing car parking spaces, thereby creating space for a greater quality of life.

- Good role models make a contribution to urban transport policy as well as to a social paradigm shift and practised bike mobility.

- Mobility hubs in the immediate residential vicinity serve to bring an awareness of mobility to population groups for whom cycling has previously played a subordinate role.

- Especially for tenants in subsidised housing, a low-threshold offer can lead to more social participation across the whole urban space.

Contents

Forewords

"The organisation of mobility is a decisive factor for a liveable and socially just city. The housing industry can and must also make a contribution to this by providing its residents with the broadest possible range of mobility services. The City of Munich is supporting this by enabling suitable building-related mobility concepts which can reduce the need for some of the vehicle parking spaces and thus provide more space for other uses. Our 'Mobility Strategy 2035' envisages the expansion of this possibility even further in the future."

Georg Dunkel
Mobility Advisor for the City of Munich

Welcome to this guide for the mobility hubs of Münchner Wohnen.

At a time when sustainable mobility solutions are becoming increasingly important, our mobility hubs offer a practical and cost-effective solution to the challenges of urban transport in Munich. These hubs serve as central contact points for our tenants and act as a visible focal point for mobility in the districts.

In order to continuously improve the mobility hubs, we are continuously evaluating their use and functionality and are open to the further development of the sharing components. Feedback is very important to us in order to adapt what we are offering to the needs of the users in the best possible way.

This guide is also intended to help us pass on our best practices and thus contribute to a sustainable understanding of mobility.

We hope that this guide is informative and helpful, and that it will contribute towards promoting greener and more efficient mobility in our beautiful city.

Thank you for your interest!

Kind regards,
Yours, Christian Müller
Management Board of Münchner Wohnen

The way we get around plays an important role in the process of socio-ecological transformation. The switch from motorised private transport to cycling not only promotes the achievement of climate and environmental protection targets, but also strengthens participation in urban life for many residents of the city.

As a municipal housing association, Münchner Wohnen is in a position to have a significant influence on the sustainable, inclusive and socially just design of the urban mobility structure.

This booklet presents Münchner Wohnen's approach and shows how alternative mobility services can be implemented in a tangible way in the estates. Among other things, the services pursue the goal of integrating cycling into the everyday life of tenants and for it to thereby become a constant feature of urban traffic.

Steffen Knopp
Mobility Manager
Sustainability and Climate Protection Section
Münchner Wohnen

# The motivation of Münchner Wohnen to establish mobility hubs

What does mobility mean?

Being on the move and moving from one place to another is one of the basic human needs. People are mobile because they cannot or do not want to satisfy certain needs in their current location. Traffic is only the means to an end: It serves to overcome distances. Mobility, on the other hand, refers to any kind of movement of people or groups within spatial or social systems. Mobility can mean short or long distances, it can cause a large or small amount of traffic and it is associated with different amounts of energy and costs.[2]

"In newly-planned residential districts, we need public areas with green spaces in which families are invited to spend time, thus contributing to an environment worth living in. We are creating the space for this through innovative mobility services in each district. Because, if we plan wisely, fewer parking spaces will be needed in the residential districts and space will thereby be created for other uses."

Bavarian State Ministry of Housing,
Building and Transport, 2022

The ecological, social and spatial aspects are different action areas of mobility that are intertwined.
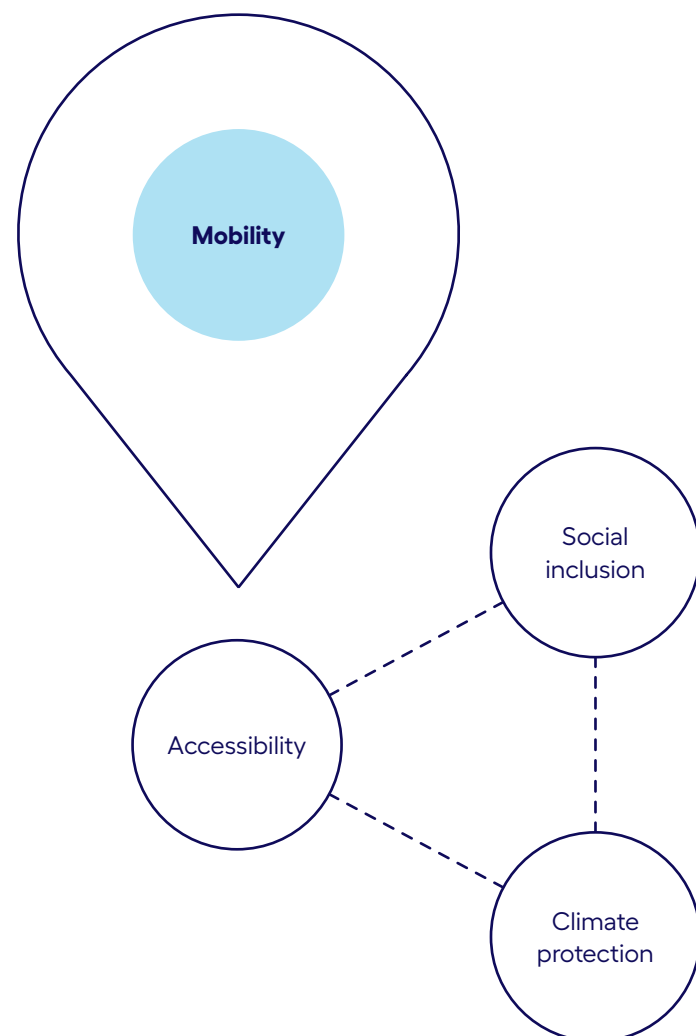
**The ecological aspect:
Urban space, quality of life and Münchner Wohnen's climate protection strategy**

In urban areas, discussions about alternative mobility services are gaining in importance. Urban areas are characterised by a high population and building density as well as functional spatial specialisation and socio-spatial differentiation. In addition, towns and cities have a central function, which is reflected in the political and economic importance of the area. They are centres of consumption of human energy and resources and the place of origin of greater environmental pollution.

Therefore, not only in terms of social inclusion, but also with regard to climate changes, there is an increasingly urgent need to provide more climate-friendly alternatives to mobility using combustion engines which run on fossil fuels.

To this end, the areas currently occupied by motorised private transport could be redesigned into places with improved air quality and a greater quality of life for city residents.

Münchner Wohnen, too, is working intensively on the issue and has developed a climate protection strategy which governs all departments within the company. One sub-strategy of this concerns how to deal with mobility.

The main action areas of
Münchner Wohnen's climate
protection strategy

E   Environmental
S   Social
G   Governance
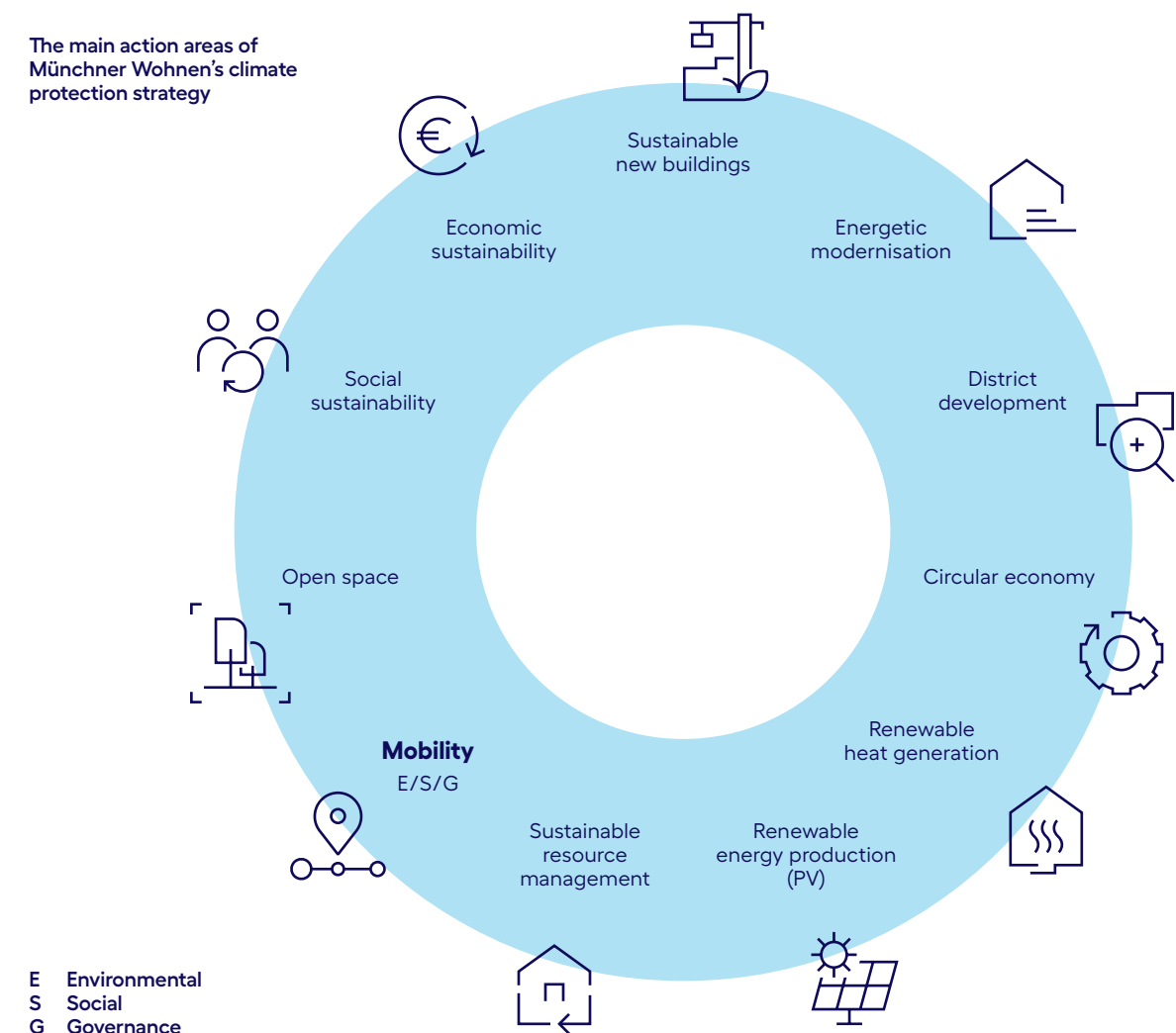
The continuous commitment to sustainable construction is the declared goal of Münchner Wohnen. It is aware of its responsibility as a sustainable, socially orientated, municipal housing association and is therefore implementing numerous measures to reduce motorised private traffic. As a result, the number of car parking spaces and the associated consumption of resources can be reduced.

The reduction in parking spaces and the associated reduction in underground car parks eliminates a large proportion of non-renewable primary energy in production. The ecological assessment of many buildings shows that the structural materials for civil engineering (underground car park, basement rooms etc.) in particular determine the balance.

In addition, a smaller underground car park leads to fewer sealed areas and has a positive effect on the design of the open spaces, as better infiltration and the planting of large trees are possible. Saving costs is of course also an unavoidable measure in the context of affordable housing.

12.7 t CO$_2$e

is the result of a single underground parking space, with 33.6 MWh of non-renewable primary energy consumed.[3]
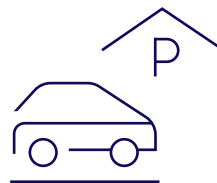
"The aim of the mobility sub-strategy is the resolute continuation and further development of multimodal mobility services in municipal housing. From the point of view of Münchner Wohnen, alternative mobility services today belong in the context of sustainable district development – always in conjunction with supplementary measures in the public sphere and the mobility strategy of the municipalities. The opportunities with regard to lasting change in the modal split are immense in the housing sector."
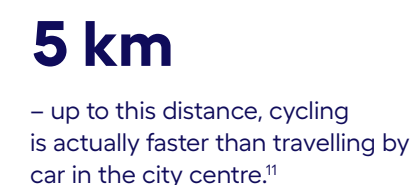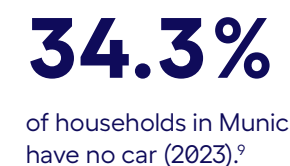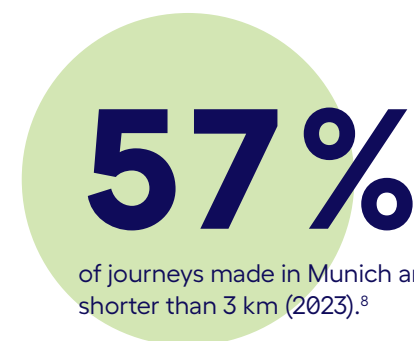
Steffen Knopp, Mobility Manager
Sustainability and Climate Protection Section
Münchner Wohnen

The social aspect:
Mobility for all as a prerequisite for social inclusion

As diverse as people are, so are their mobility needs and movement habits. Access to mobility always means social inclusion, too. Mobility is a fundamental prerequisite for social inclusion and the opportunity to participate in social life. It goes far beyond the mere accessibility of workplaces and public facilities. Mobility also means the opportunity for social encounters, cultural and political activities, leisure activities and time with family and friends. People who have reduced mobility are often confronted with exclusion from social life.[4]

This means: Those who cannot afford mobility or who do not have access to transport are in a certain way excluded from society and have fewer opportunities and possibilities to live their lives freely.[5] However, the quality of access to mobility varies widely and depends on various factors. Income, wealth and the purchasing power associated with them play a decisive role, as does the place of residence and its connection to the transport system. Educational attainment and the ability to use complex transport services also influence the chances of easy and affordable access to places and facilities.[6]

In particular, the focus on the car, the development of housing structures as we know them today and the associated path dependencies and routines are responsible for the fact that we are confronted with high traffic volumes today and yet, at the same time, we are supposedly dependent on the car.[7] However, focusing on the car also excludes a large number of groups of people: People who cannot afford a car or who cannot drive themselves for various reasons, such as children and teenagers, elderly or sick people, or those who do not have a driving licence.

57%

of journeys made in Munich are shorter than 3 km (2023).[8]

34.3%

of households in Munich have no car (2023).[9]

761,349

cars are registered in Munich. 7% of them are EVs (2023).[10]

5 km

– up to this distance, cycling is actually faster than travelling by car in the city centre.[11]

79%

of all journeys made by Germany's urban population begin or end on their own doorstep (2018).[12]

6 km

is the average journey length in Munich (2023).[13]

1,400 football pitches

are taken up by parked cars in Munich alone – that's 10 square kilometres.[14]

The spatial aspect:
Residential areas and mobility

The fundamental core issues of the desired mobility turnaround are how to avoid, relocate and improve traffic: This means not regulating uses, but bringing them together, integrating sustainable means of transport into everyday life and making traffic more efficient.

Especially in an urban context, the 15-minute city is a well-known catchphrase. The concept aims to satisfy needs in the immediate residential environment without the need for a car: a supermarket around the corner, doctors and childcare in the parallel street, educational institutions nearby, workplace and leisure facilities within walking distance. In addition, there are new opportunities through digitalisation, information and communication technologies and technical innovations.

The 15-minute city is an urban development concept that focuses on the accessibility of destinations required on a daily basis.
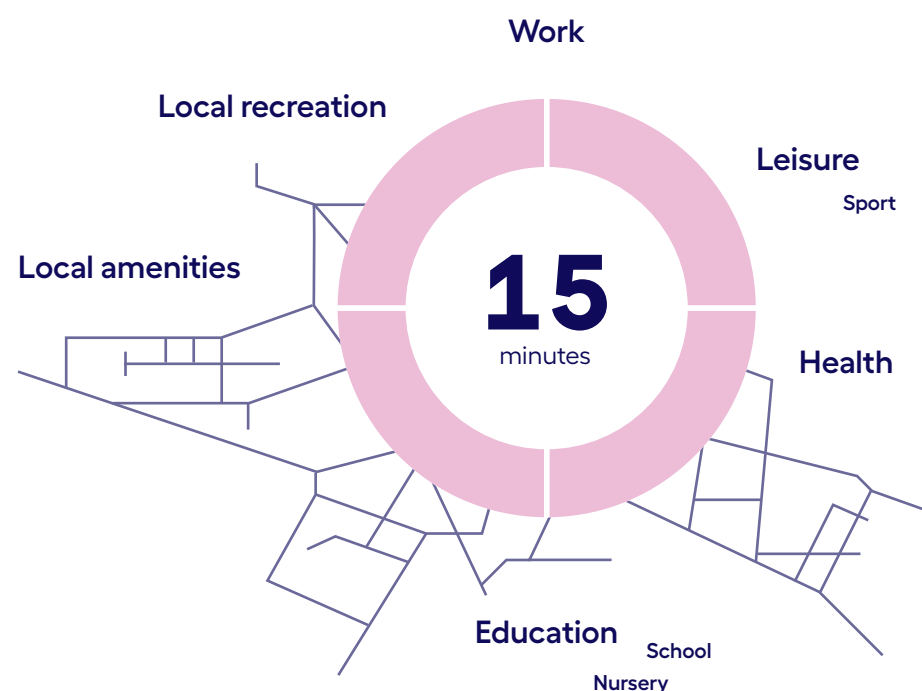
In fact, there are signs of a rethinking of attitudes towards the car, and changes in behavioural structures can be observed which are associated with less car traffic and are multimodally orientated.[15] Everyday mobility is strongly intertwined with the place of residence, because this is the start or end point of the vast majority of all journeys made every day.

The choice of means of transport basically depends on the availability, accessibility, travel costs, travel time and comfort of the means of transport. However, the close connection between residential location and mobility also means that the housing situation, the residential environment and the mobility services in the local area have a strong influence on mobility behaviour.

It is quite clear: the place of residence is the decisive starting point for our mobility and the resulting traffic. When considering how to design mobility in a sustainable way, the residential environment must therefore play a central role.

Work

Local recreation

Leisure
Sport

Local amenities

15
minutes

Health

Education
School
Nursery

02

Mobility hubs: public, in the district and in the immediate residential environment

Mobility hubs serve not only to diversify the range of mobility on offer, but also to link different forms of local mobility to promote multimodality and intermodality. The aim is to ensure needs-based mobility and, at the same time, to reduce the external effects of transport.[16]

Mobility hubs aim to strengthen the environmental alliance and reduce the use of private cars as well as car ownership. This not only contributes to the reduction in environmentally harmful emissions, but also leads to the saving of space in stationary traffic.[17]

40%

of cars are not used on an average day. The average usage time per car per day is about 45 minutes, which is only 3% of the total time in one day.[18]

Mobility hubs have become important points of contact, especially in an urban context, when it comes to getting from A to B. In the public debate, there is always an undifferentiated view of the different types of mobility hubs and sharing services.

Therefore, we would like to go into more detail about the differences below.

Public mobility hubs

When most people think of the term mobility hub, they think of services provided in public spaces, for example by transport companies. These are sharing services that are bundled together at one public location, often at local public transport hubs. Examples of this are the mobility points in Munich or the Jelbi stations in Berlin.

The idea of a public mobility hub is similar to that of a public transport stop. It serves as a central interface for a large number of users. The challenge for public hubs lies in the diversity of needs and demands on mobility, the different spatial conditions and a worthwhile addition to local public transport.

ⓘ

Intermodality

Intermodality refers to the use of different modes of transport one after the other, with the transition between the modes of transport being seamless. A person travels intermodally on the way to work if he or she first cycles to the public transport stop, then takes the S-Bahn (suburban railway) from there and finally reaches his or her destination on foot.

Multimodality

Multimodality in passenger transport, on the other hand, refers to the possibility of using different means of transport. A person travels multimodally if he or she uses different means of transport – for example, takes the bus to work and a rental car to the DIY store. Both concepts promote flexible and sustainable forms of travel.

The City of Munich will be establishing 200 so-called mobility points around the city over the next few years. This is intended to make it easier for citizens to access the wide range of shared mobility services in Munich.[19]

Various services such as car sharing, bike sharing, kick scooter sharing or cargo bike sharing offered by municipal or private providers are combined in different ways. Whether at central points in the city centre, in residential areas, on industrial estates, with or without a public transport hub – the location often determines what is available and the possible uses.

The aim of these hubs, above all, is to promote intermodal, sometimes multimodal mobility behaviour. The focus is often on routes in the form of A-B connections. Features of these hubs are their visibility, intuitive findability and a uniform external appearance and/or communication.

Mobility hubs at a residential location

An alternative to this is offered by residential location-specific mobility hubs, such as those of Münchner Wohnen. These provide sharing services in the immediate local area that are specially tailored to the needs of the residents. The services are individually adapted for the users and also take into account various aspects such as age structure, mobility restrictions or marital status.

Clearly visible, they make it easier to decide on the most environmentally friendly mode of transport possible – and in the immediate vicinity of the home. The increased use of alternative forms of mobility also leads (ideally) to a reduction in private car ownership. For this purpose, an area will be made available right beside or even in the residential building which will be used for a wide range of sharing services.

The result is an innovative solution for diverse and sustainable urban mobility at home. In addition to the two-wheel mobility elements, household items can also be integrated and thus made sharable, such as a household ladder or a sack truck.

The services provided by Münchner Wohnen
are very well received by the residents.

While public mobility hubs are naturally aimed at all residents of and visitors to the city, i.e. they are available to an open group of users, the group of users of residential-based mobility hubs is often limited to the residents of the building and is therefore closed.

However, there are also mixed forms in which, for example, cargo bikes are made available on private land and can then be rented by an open group of users.

Public e-cargo bike rental hub
on private property

Mobility hubs at district level

If district-related concepts are created, for example in larger district developments such as Freiham in Munich or the Lincoln Estate in Darmstadt, the challenge is to dovetail the two levels of public and project-related offers in the best possible way.

Synergies can be achieved through a sensible bundling of services, but at the same time, the services should still be available as close as possible to the place of residence. Different services should complement each other, and different systems (closed/open, hub-based/free-floating) appeal to different user groups. At the same time, the services may potentially have to be economically viable and should in no case cannibalise each other, but rather complement each other. An overarching concept that is coordinated with all stakeholders involved (especially builders) is therefore essential for such planning.

To sum up about mobility hubs

Mobility hubs have a variety of advantages. Multimodal mobility and the environmental alliance are strengthened, a new mobility culture is promoted and the trend of "sharing instead of owning" is encouraged. Another positive effect of the mobility hubs is the reduction in the need for parking spaces and thus housing costs. The promotion of local mobility and the relief of stationary traffic results in positive effects such as a reduction in noise and pollution. Last but not least, mobility hubs are an attractive and affordable mobility service for everyone.

Compared to existing residential districts, mobility hubs are easier to implement in new builds: areas and services for project-related mobility hubs can be planned from the outset, and in Munich there is a great incentive to offset the number of car parking spaces with such services being on offer. Ideally, conflicts of use in public spaces can be avoided in the first place by intelligent concepts, and private and public services can be dovetailed in an overall concept. Nevertheless, it is precisely the existing residential districts that often suffer from a high volume of traffic and in which there is sometimes a lack of differentiated services on offer. They reflect the major challenges: on the one hand, to provide the necessary space for sharing services and, on the other hand, to create financial incentives in addition to a differentiated offer from the public sector so that private owners also make their own contribution to sustainable mobility.

In some districts, these issues are already being addressed and it remains exciting to see how the aspect of services on offer close to home will develop in existing districts.

Mobility hubs
in Munich

**Munich's overall strategy for mobility
and transport 2035**

Munich is facing a number of challenges in implementing the mobility transition. On the basis of various studies, the following trends can be identified:
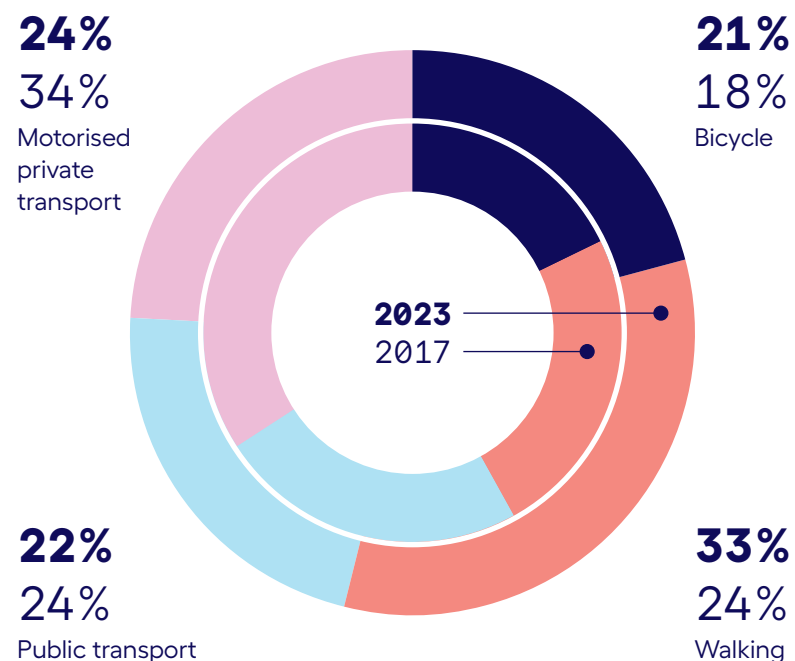• Continuous population growth
• Rapid growth in commercial traffic
• Steady increase in passenger cars
• Only a slight increase in the degree of motorisation[20]

For the implementation of the transport transition, the Munich City Council adopted the draft of a new overall strategy for mobility and transport on 23rd June 2021.[21] It provides orientation for the entire urban society, is an integral part of the urban development concept "Munich Perspective" and is closely interlinked with the new climate strategy.

The aim of the overall strategy is to increase the quality of life and promote public welfare. A high level of accessibility is on a par with a high quality of life. In order to achieve a comprehensive and secure implementation of the goals and decisions, they are projected onto the smaller scale of the district level.

The specific goals of the mobility strategy:[22]
• In the area of climate and environmental protection, at least 80% of journeys are to be made by zero emission transport by 2025, and 2,800 charging stations are to be set up in public spaces.
• Road safety is to be improved in such a way that there are no more traffic fatalities (Vision Zero).
• The share of the modal split of local public transport is set to increase to 30% by 2025, and 200 mobility points are to support shared and networked driving.
• Cycling is to be promoted with a further 1,000 cycle parking spaces per year, and the citizens' initiative "Radentscheid" (a cycling campaign for better infrastructure) will be implemented accordingly.
• Increased attention will be paid to pedestrians (pedestrian check and pedestrian guidelines).

Standardisation in Munich

For a long time, the parking space regulations for cars were the only binding basis for the issue of mobility in residential construction. In 2012, cycle parking regulations were issued in Munich for new builds, extensions and changes of use.

The abolition of the parking space requirement is being widely debated in public as well as in regional and local politics. Berlin and Hamburg have already largely abolished it. Munich and also other larger and smaller municipalities are taking a different approach: Here, the parking space regulations have been made more flexible and mobility concepts are enabling a reduction in parking spaces. In Munich, this has so far only been possible in residential construction.

The advantage for the municipality of sticking to the parking space regulations for cars is that it has a lever to demand mandatory compensatory measures (e.g. cargo bike sharing) in the event of a parking space reduction. This creates pressure for housing developers to take action in the interests of the mobility transition. For the housing developers, the advantage is that the services on offer can be refinanced through the construction cost savings of the reduced car parking spaces. However, it should be noted that the mobility concept in Munich must be formally maintained for the entire lifetime of the property.

In 2016, surveys in the subsidised housing segment in Munich showed a significantly lower demand for parking spaces for cars, whereupon the ratio of required parking spaces was lowered from 1.0 per residential unit to 0.8 or 0.6 for subsidised housing. The corresponding City Council resolution[24] also opened up the possibility of adapting the ratio of required parking spaces to the specific needs of a construction project via a mobility concept. The prerequisite for this is that the project is well developed through local public transport services and local amenities. What a mobility concept should look like is decidedly regulated on a "mobility concept" form, which is becoming an integral part of the planning application.[25]

In order to give practical assistance, the City of Munich has published a detailed guide on this.[26]

The aim here is also to expand the services offered to residents with a mobility concept. Whereas previously only car and cycle parking spaces were an issue, a number of other services are now being created to facilitate, among other things, local mobility and the transport of goods by bicycle.

The "Mobility Concept" form of the City of Munich provides precise calculation methods for the correlation between the number of car parking spaces and supplementary services. This ensures that builders who want to reduce the number of car parking spaces to a greater extent must also implement more supplementary measures (see also muenchenunterwegs.de).

With the planning permission in conjunction with a mobility concept, the builder is therefore partially exempt from the parking space requirement. Building costs for a parking space, which can reach 40,000–90,000 euros per underground parking space in Munich, add up to a considerable amount. This is a factor that can significantly increase the motivation to invest in mobility concepts.

24%
34%
Motorised
private
transport

21%
18%
Bicycle

22%
24%
Public transport

33%
24%
Walking

2023
2017

Modal split in the City of Munich

The residents of Munich have developed a new enthusiasm for walking: In 2023, the population made 33% of their journeys on foot, an increase of nine percentage points compared to 2017. The proportion of journeys made by bicycle also increased by three percentage points during this period. In 2023, local public transport almost reached the levels recorded before the coronavirus pandemic, while motorised private transport declined significantly (from 34% down to 24%).[23]

The mobility hubs
of Münchner Wohnen

From planning to implementation

In new housing developments, but also in urban renovation and densification projects, the implementation of mobility concepts is to become the standard. A key success factor is the type of design of the local mobility hubs which adapt to the usage behaviour of the residents and provide a variety of needs-based services in the immediate vicinity.

Together with good internal and external access to the district by public transport and short distances to be able to satisfy daily needs, sharing services enable a life without your own car and at the same time increase your quality of life.

Extensive planning is required before the services can be used by the residents.

Münchner Wohnen mobility hub
in Freiham

The concept of mobility hubs

Highlights

This is a fully automatic mobility and sharing hub for various rental items for the residential area. The equipment is variable and can be adapted at short notice to changing needs.

Both the unlocking of the rental items and access to the room are granted using the same personalised RFID chip (the so-called "mobility chip" of Münchner Wohnen).

Thanks to extensive real-time monitoring with automated notifications to users and the administration, the administrative effort is particularly low.

The friendly and bright corporate design of Münchner Wohnen and the good lighting create a pleasant and safe atmosphere.

What can be used?

- E-cargo bikes, pedelecs, bicycle trailers, sack trucks, ladders, flatbed trolleys, handcarts
- Bicycle service station with extensive tool set

Who can borrow items?

The user group is currently limited to tenants of Münchner Wohnen and can be scaled on an item-specific basis. It can be extended optionally to a public user group.

How can the items be borrowed?

Depending on the technical set-up, you can choose between an RFID chip key or a smartphone app.

Software

- for automatic return check
- for automated email notification to the administration
- for automated fault and misuse diagnostics
- for real-time availability detection
- for short-term reservation option

Overview of the process

The specific project is analysed and coordinated with the building department and the planning office with regard to item planning and the spatial and design requirements derived from it, construction schedule planning and costs, and then submitted for planning permission. The implementation of the mobility services must be put out to tender, and the mobility providers must be selected and commissioned.

Stakeholders or departments:
- New build/renewal of existing buildings/project development
- Climate protection/sustainability/ mobility
- Building construction planning office
- Mobility hub project planner
- Building manager/rental manager
- Procurement/purchasing

Page 26

Everything is prepared for commissioning: Communication measures, information for tenants about the mobility concept and the parking situation locally, applications for semi-public events, catering, internal and external invitations, photography, room cleaning, showcase, fire alarms etc.

Stakeholders or departments:
- New construction/renewal of existing buildings/project development
- Climate protection/sustainability/ mobility
- Building manager/rental manager
- Caretaker's office/central services
- Communication
- Tenant service
- External contractual partners (e.g. car sharing, maintenance and service)

Page 38

Evaluation by commissioned framework contract partners: mobility hub, car and bike sharing etc. If necessary, feedback of the evaluation to the approval authorities, e.g. Mobility Department of the City of Munich

Stakeholders or departments:
- Climate protection/sustainability/ mobility
- External contractual partners (e.g. car sharing, bike sharing)

Page 43

Design

Planning

Building construction and technology

Communication and commissioning

Operation

Evaluation

As a strategic plan, a mobility concept defines the basic framework conditions for sustainable mobility in the respective construction project for the coming years and decades. When designing mobility concepts, the needs of the users are taken into account as well as the goals from the corporate strategy (ecological/economic) and the political objectives of the City of Munich.

Stakeholders or departments:
- New build/renewal of existing buildings/project development
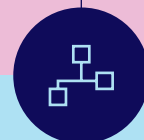- Climate protection/sustainability/ mobility

Page 24

In mutual exchange, the planning principles are coordinated in detail with the project planners involved, carried out and monitored during the construction process.

Stakeholders or departments:
- New build/renewal of existing buildings/project development
- Climate protection/sustainability/ mobility
- IT (for internal network connection)
- Building construction planning office
- Mobility hub project planner in cooperation with construction and other project planners
- Electrical and network technology project planner

Page 34

Processes and responsibilities must be defined for ongoing operation. Binding internal or external contact persons for user enquiries, registration processes and damage claims. Clearance, care and maintenance of the room, interfaces with external service providers, maintenance, repair and replacement procurement, automated communication processes, de-escalation management.

Stakeholders or departments:
- New construction/renewal of existing buildings/project development
- Building manager/rental manager
- Caretaker's office/central services
- External contractual partners (e.g. car sharing, maintenance and service)

Page 40

Best practice: the mobility hubs in Ittlingerstraße

As part of the densification measure, two mobility hubs for new and existing buildings (380 residential units) were also implemented in adjoining buildings in Ittlingerstraße.

A wide range of services fulfils a wide range of needs: In addition to mobility services, household items are also integrated into the hubs.

Key data of the mobility hubs in Ittlingerstraße

Number of new residential units (densification)	80 units
Number of existing residential units	300 units
Total site area	29,208 m²
Site footprint, existing and new	34,327 m²
Site footprint, existing	25,643 m²
Sharing area	90 m²
Parking space ratio	0.5
Commissioning	June 2024

Location of the mobility hubs in Ittlingerstraße in the Munich district of Feldmoching-Hasenbergl

Ittlingerstraße
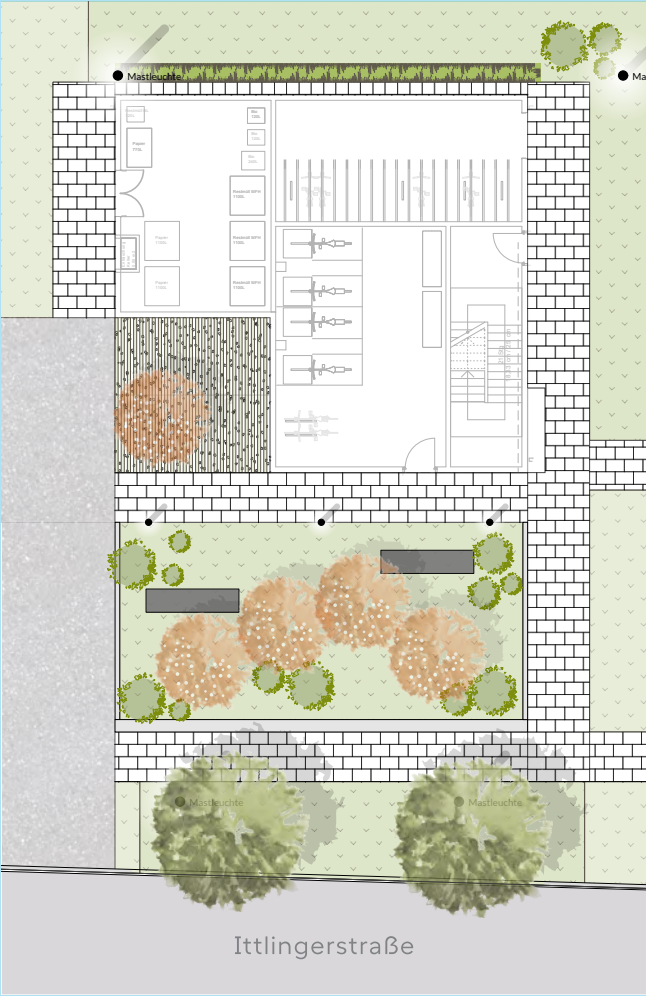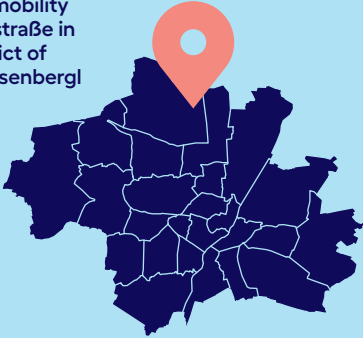
Mobility hub floor plan, not to scale

Framework conditions and analysis

If a mobility hub is to be implemented as part of a new project, Münchner Wohnen develops a corresponding concept in collaboration with the commissioned planning offices. The first step is to check whether the requirements are met for implementing a reduction in the number of parking spaces (see Chapter 3, section: Standardisation in Munich).

The framework conditions play a major role in the success of a mobility concept. In particular, the development of local public transport and other mobility services as well as the availability of local amenities and services for daily needs within walking distance is the basis for being able to cope with everyday life without one's own car. An analysis of the project location summarises these aspects of the development.

In addition, other aspects relating to the target group of future residents also have an important part to play in the analysis. What sort of daily life are they coping with? What is the composition of the households – will there be more families or more single people moving in? Are they limited in their mobility?

All these factors have an influence on how people get around and, as a result, which services can add value for residents in their daily lives and how they get around. In social housing, these aspects are unfortunately only known to a limited extent in advance, but in principle, conclusions can always be drawn to a certain extent from the housing mix, the planned size of the dwellings, the funding models that may be taken into account and the future budget structure. However, the mobility concept should in any case always be geared towards ensuring that the measures can also be adapted to the needs of the residents in the future, e.g. by providing sufficient space.

Selection of measures

On the basis of the location analysis, suitable mobility measures can then be worked out.

Depending on the mobility concept, different rental vehicles or items are planned for shared use, such as bicycles, pedelecs, e-cargo bikes, bicycle trailers of various types and tickets that can be borrowed for local public transport. The focus is clearly on coping with everyday life on foot and by bike. In addition, car sharing is an important supplementary component. The building blocks are designed in such a way that they can be maintained for the life of the buildings.

The services are therefore supplemented or exchanged at regular intervals. The frequency depends on the condition of the mobility components and the needs of the residents. All planning and construction methods are therefore planned and executed as universally and future-proof as possible.

In principle, a mobility concept has the greatest chances of success if it combines a large number of different services so that it offers a suitable solution for as many life plans as possible at the project location.

Münchner Wohnen's services are generally available to tenants, but an extension to other users, e.g. from the district, is conceivable in principle. First and foremost, however, they are intended to enable the residents of Münchner Wohnen to have a wide range of mobility.

Once the measures to be implemented have been determined, they must be incorporated into the planning process accordingly. This aspect will be examined in more detail in the next chapter.

As part of the analysis, the basic prerequisites (conditions for local public transport and local amenities) are examined.[27]

- ● Residential location Ittlingerstraße
- **U** Underground station
- **BUS** Bus stop
- **SC** Shopping centre
- **S** Supermarket

The concept for Ittlingerstraße consists of two mobility hubs where various services are bundled. The type and number of the respective modules will be individually coordinated with the Mobility Department.

The following mobility components are available for tenants:
4 e-cargo bikes,
2 pedelecs with permanently installed trailer,
2 pedelecs,
2 bicycle trailers with baskets or handcarts,
2 sack trucks,
2 stepladders,
2 bicycle service stations,
4 parking spaces for hub-based car sharing
and
2 multi-provider parcel lockers.

05
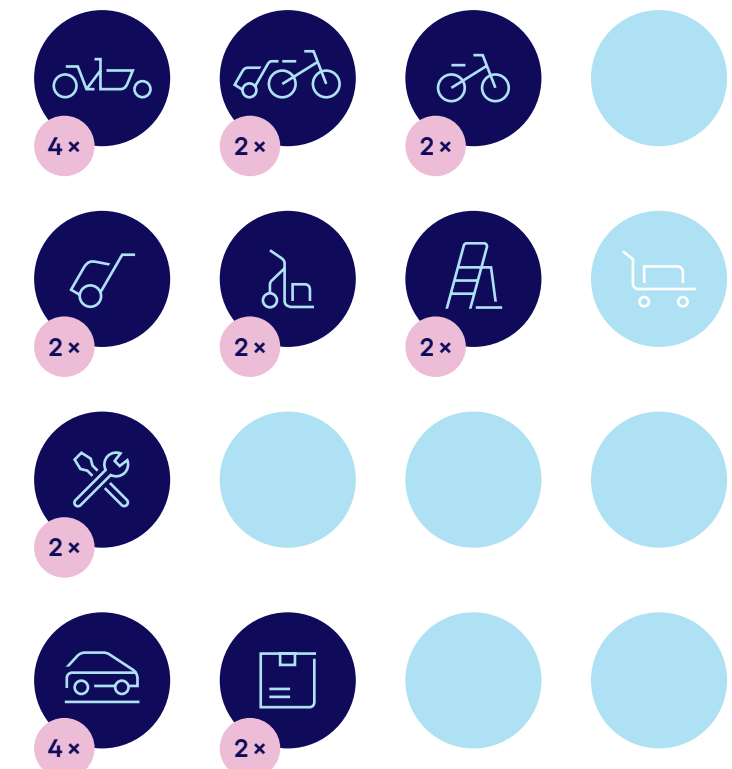
Planning

It is important to deal with the mobility concept at an early stage during the planning process, as many decisions must be incorporated into the overall concept of building, underground car park and open space planning at the very beginning of the project.

Stakeholders to be involved

Numerous stakeholders must be involved in the planning process. Most of the interfaces are with building planning/architecture and possibly outdoor space planning. Ideally, the requirements of the future operators are already included at this point. Apart from specific requirements that should be observed, it is essential to involve the providers of the specific systems at the latest during the detailed planning. For example, it makes a difference that some systems require accommodation in the building, while other systems can even be located in an open space, sometimes without a roof.

At Münchner Wohnen, the Sustainability and Climate Protection Department plans the mobility components as envisaged in the concept together with the respective service provider (project planner) and in close coordination with project management/construction. The procurement of the components or the borrowing hubs is usually carried out by the respective provider.

In order to ensure the predictability of a long-term service and not to have to search for new providers every time with the large number of projects at Münchner Wohnen, the services were put out to tender at an early stage and framework contract partners were selected and commissioned. During the construction phase, further details of the respective technical equipment will be clarified, the components to be installed will be ordered and commissioning will be prepared.

Ideally, the providers of the mobility components should be involved in the process as early as possible.

The internal interfaces with property management, caretaker's office, technical departments of the housing association etc. must also be taken into account, as they have to implement the planning and ensure the operation of the hubs. If, for example, a stable internet connection cannot be guaranteed around the clock, IT departments can incur high costs.

The interface with the communications department is also essential. In addition to the external appearance, it is responsible, together with the building manager, for ensuring that the residents learn about the services on offer and are attracted to them (more on this in Chapter 7).

Basic location

The mobility hub is intended to be a flagship for the project. A well thought-out concept and good visibility make the start-up phase easier and guarantee the functioning of the hub. A qualitative location within the construction project and the large-scale glazing of the façade reduce vandalism and promote a better quality of life, identification with the location and a willingness among the tenants to cooperate. In short: The mobility hub invites you to make use of it.

An area on the ground floor makes sense from different points of view. Due to their weight and dimensions, cargo bikes can hardly be placed in the basement, and both visibility and attractiveness and also user-friendliness would suffer if they were located in the underground car park. In addition, there is the problem of possible intimidating spaces.

The space required by a mobility hub also includes turning and manoeuvring areas.

However, compromises can be made when it comes to the accommodation of pedelecs and bicycles in the basement but, for safety reasons, an intersection of cycle paths and car lanes must be avoided.

For sharing vehicles, however, a basement set-up should always remain the second choice. As a rule, it makes sense to provide all services in a bundle in order to support the points mentioned.

"Planning implications must be taken into account at an early stage of the planning and construction costing. The location and accessibility of the mobility components used require coherent and possibly innovative approaches from the planners involved in the planning of buildings but also of the outdoor facilities. The integration of the interfaces involved within Münchner Wohnen ensures a predictable planning approval process."

Susanne Kraus
Section Head, Sustainability and Climate Protection, Münchner Wohnen

In the context of location-based mobility hubs, car sharing should always be designed as a hub-based service: The vehicle must always be returned to the starting hub. There are various reasons for this. On the one hand, as already described, the service should be reliably available in the immediate residential area (e.g. in the same underground car park or in the adjacent building). On the other hand, hub-based car sharing, in contrast to free-floating, is said to have the ability to replace private cars.[28]

In the planning process, the car sharing vehicles are assigned specific parking spaces, which are marked and signposted accordingly. In principle, this can be done both in an open space and in the (underground) garage. Car sharing providers work with different access systems, depending on whether access should be possible exclusively for people from the residential complex or for everyone. In the case of an open user group, registration with the car sharing provider is required.

In addition to the location itself, it is important to already consider a possible expansion of the service at the planning stage. It is the declared goal of the City of Munich and also of Münchner Wohnen that the service is so well received that it will find even more users in the future and change the mobility behaviour of Munich's urban society in the long term. The possibility of a later expansion of the service is supported by the fact that parking spaces are rented out through separate rental contracts and are not linked to the dwellings.

Car sharing is also an important component of mobility services.

Two mobility hubs have been enriching the residential environment in Ittlingerstraße since 2024.

ℹ

Free-floating and stationary sharing services

The difference between free-floating and stationary sharing services lies primarily in the flexibility and type of use.

Free-floating sharing offers allow users to borrow vehicles (such as cars or bicycles) at any location within a defined geographical area (business area of the respective provider) and also to return to any location within this area. This means that the vehicle does not have to be picked up or returned to one specific location. This enables one-way journeys and inter-modal route chains.

Stationary sharing services, on the other hand, require users to pick up and return the vehicles at specific, fixed hubs. These hubs are often located in strategically important places such as railway stations, in city centres or even in districts close to home. The advantage of this type of sharing is that the availability of the vehicles is easier to plan, as they are stationed at fixed points.

To sum up: free-floating offers more flexibility and freedom of use, while stationary services enable more structured and plannable use.

The services must meet the following requirements:
• visible
• easy to find
• easily accessible

In order to provide safety, the areas should meet the following requirements:
• bright
• well-lit
• visible from outside

A brightly lit room increases the quality of life and promotes use.

Design and recognition value

Findability and visibility are essential for the use of the mobility hubs, especially in the start-up phase. A uni-form design and a word/image brand ensure quick recognition.

In a (digital) guide, planners will find design components for the mobility hubs. Depending on the type and situation of the building, they can select various design elements together with the contact persons at Münchener Wohnen. On the one hand, this serves to create a uniform appearance, and on the other hand, the guide prevents the need for queries.
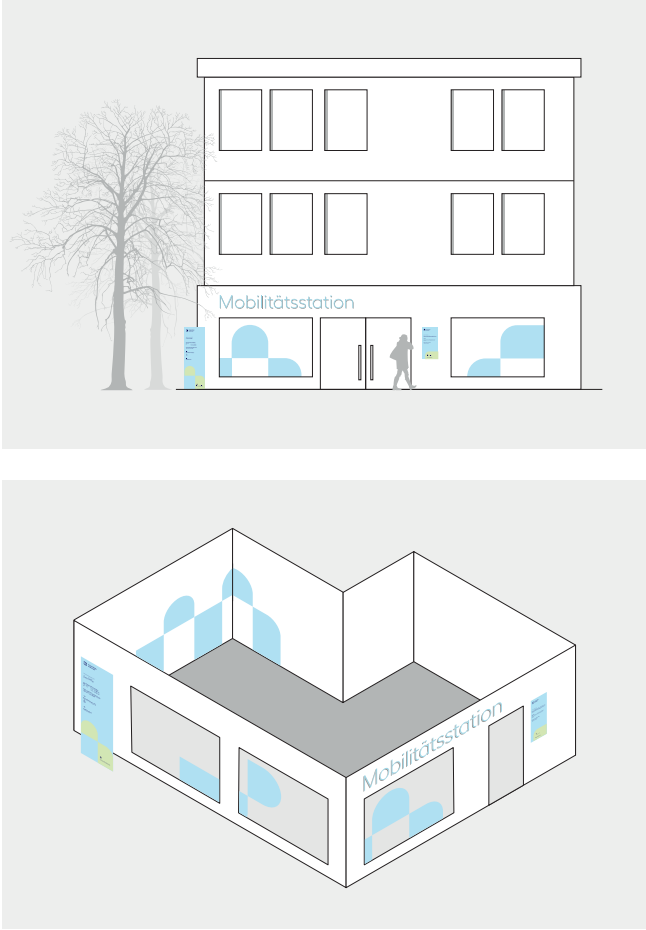
A primary and a secondary colour are selected for each Münchner Wohnen mobility hub. Münchner Wohnen's own company brand colours are used here. The selected primary brand colour is then used for all elements of the orientation system as well as for the wraps on the window panes of a facility and combined with another selected secondary brand colour.

The façade is glazed in large parts down to floor level and provided with a display window wrap in the corporate design of Münchner Wohnen. This ensures the appropriate external appearance and natural lighting.

In the outdoor area, the mobility hub can also be identified by means of steles or signs.

For the commissioning, roll-ups and flyers help to raise awareness among tenants.
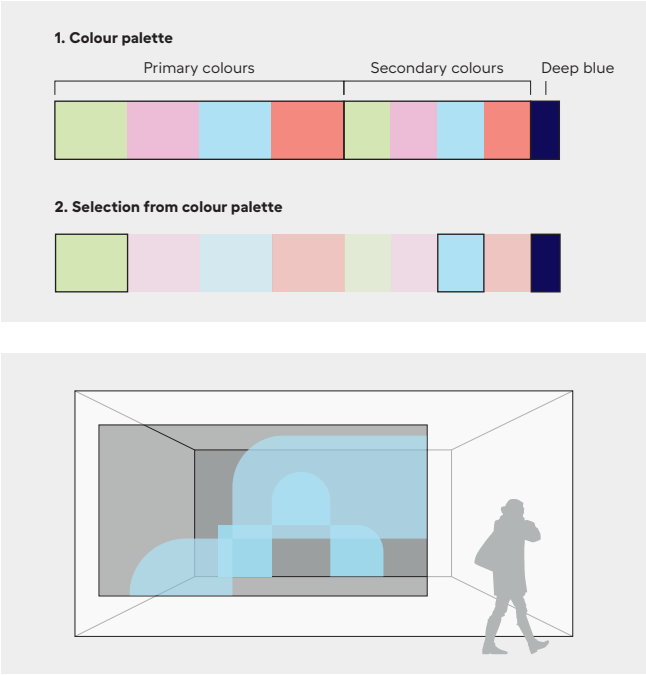
Münchner Wohnen's uniform corporate design promotes recognition.

"With their friendly colours, the mobility components are intended to catch the attention and curiosity of passers-by. Our tenants should be encouraged to try out the components themselves, to use them regularly and to enjoy using them."

Stefan Feller, Head of Climate Protection Measures at the Sustainability and Climate Protection Section of Münchner Wohnen

Above: Information boards explain what the mobility hub is all about and how it can be used.

Below: The bright, friendly colours contribute to the feel-good factor.

Selection of service providers

The service providers on the market have developed different systems in order to be able to offer various vehicles for shared use. They differ according to different criteria. Depending on the project, concept and range offered by the service providers, different providers may therefore be suitable.

A selection of implementation options is shown at the end of this booklet (see examples in Chapter 13).

A basic requirement of sharing operations is robust systems due to the targeted high usage and the expected user frequency of the individual vehicles or items and the installed systems. In addition, there is the sometimes still unfamiliar handling of vehicles, some of which are still unknown such as the cargo bike.

For these reasons, low-maintenance operation, durability and resistance to vandalism are of great importance. These exist if high-quality materials are used and vehicles suitable for sharing operations are used. At the same time, the (technical) requirements of the service providers must be taken into account as early as the planning stage.

The following questions are significant in this context:
- Is an enclosure necessary on the part of the providers? Is the hub planned to be in the open air or inside the building?
- Should the vehicles be made accessible to a closed or an open group of users?
- How should the access systems be designed? Exclusively via app and smartphone or should there be RFID chips or keys?
- Should the vehicles or elements be connected in an orderly manner in a built-in system or can they be parked freely and returned through a virtual hub, for example (geofencing: see explanation on the left)?
- Should users be able to reserve mobility components (booking system)? Should the services also be subject to a fee (integration of a payment function)?
- Which operational components (e.g. maintenance, cleaning, service hotline) should be outsourced and which should be implemented in the company itself? Or how much of the company's own resources can or should be spent on the operation?

Münchner Wohnen has put out to tender and commissioned the implementation of the planned mobility hubs as a framework agreement.

ℹ️

Geofencing vs. hub-based return

Sharing services with virtual hubs and geofencing as well as stationary return hubs each have their advantages and disadvantages. Overall, the choice between these two models depends on the specific needs of the users and the circumstances of the respective project.

With geofencing, a geographical area is defined. By transmitting GPS data from the vehicle, it is possible to determine whether the vehicle is in the defined area or not. This method is used for free-floating (for larger areas) and also transferred to small rooms of a few square metres, which then represent a virtual hub. Although these hubs are also visibly marked in the built environment, the verification of whether the vehicle has been returned at the hub is carried out using GPS.

Virtual hubs and geofencing offer flexibility, as users can pick up and drop off vehicles anywhere within a defined area. This enables flexible use and easy adjustment of the number of vehicles without major structural changes. Disadvantages include possible disorder due to inconvenient storage locations, difficulties with returns due to inaccurate positioning and dependence on technology that requires safe use of smartphones and apps.

Virtual hubs in buildings are also susceptible to technical failures, which makes operation more difficult.

In contrast, permanently installed return hubs, where the vehicle is parked and connected, offer a structured solution.

They ensure an orderly appearance, make it easier to find the vehicles and simplify the return process. In addition, providers have better control over the use and location of the vehicles. Disadvantages are the limited flexibility, as the vehicles are tied to locations, the space required and the structural requirements for fixed hubs.

"At the very heart of putting services out to tender was the low-cost operation of the entire facility. Since it is not always possible to have a contact person on site, this aspect was particularly important and led to the tendering of automated elements such as automated delivery and return without personal assistance on site. Another important position in this context was the possible, digitally networked operation of the facility in order to be able to manage the users centrally and to regularly monitor and evaluate the mobility components."

Antonello Ferraro, Project Developer
Sustainability and Climate Protection Section
Münchner Wohnen

06

Building construction and technology

Fundamentally, every project is different, so the hubs are individually adapted to the requirements of the respective project. Nevertheless, there are some basic things to consider.

Structural requirements

The aspects listed must be taken into account in building construction and are therefore also relevant for tenders in the sub-areas mentioned.

Rooms and doors
In principle, the need for the required sharing space in Munich results from the formalised handling of mobility concepts in residential construction and is bindingly rooted early in the planning process under approval law (planning approval and declaration of commitment). Münchner Wohnen attaches great importance to demand-based mobility services from the user's perspective. All mobility hubs are designed to be barrier-free – with a focus on appropriate low-threshold accessibility. In the dimensioning and geometry of the rooms, additional space must be taken into account for the entry and exit and, potentially, the turning of the cargo bikes ("manipulation space").

The floor space requirements are to be regarded in the same way as in a garage, i.e. dirt from the roads, risk of slipping and special stresses, e.g. scratching by bicycle racks, must be considered. At Münchner Wohnen, therefore, an abrasion-resistant finish with a two-component epoxy resin coating (layer thickness of min. 1.5 mm) is used in most cases. The stressed walls are painted with a washable latex paint.

Good barrier-free accessibility of the hubs is essential.

The exterior door is designed as an automatic door, usually with RFID access technology and/or pin pad and an automatic door handle on the inside. The width clearance must be at least 1.10 m, as it must also be easy to pass through with an e-cargo bike. Alternatively, the automatic door can open from the inside upon approach. It then closes again after about 5 seconds, as manoeuvring with cargo bikes takes some time.

Fire protection must be clarified with the respective responsible authorities. Connection to the fire alarm systems is recommended if such a system is planned in the building in question.

With an RFID chip, every eligible household receives individual access to the mobility hub.

Stationary pick-up and blocking devices enable functional assignment and ensure orderly parking of the rental items.

For greater flexibility, the cables are installed as a surface-mounted installation if at all possible.
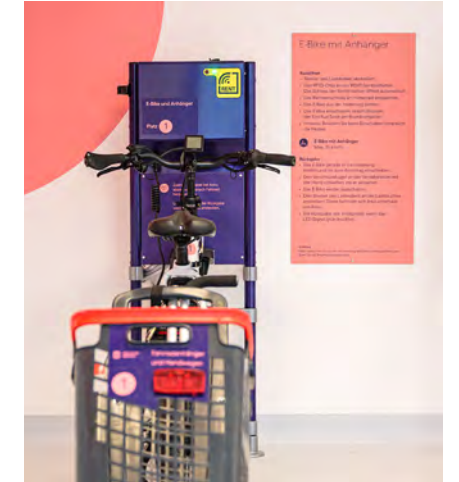
Stationary blocking devices
For orderly parking and a tidy environment in the mobility hub, stationary pick-up and blocking devices are available. By functionally assigning the rental items to a specific parking space, the value retention of the rental items and the attractiveness of the mobility hub are to be promoted. In addition, cleaning the room is also made easier. Another advantage is that other items such as ladders or sack trucks can also be integrated into the rental.

Each parking space should be equipped with its own power line including miniature circuit breakers. With a view to the possible later redesign of a mobility hub with different rental items from those originally planned, the cables (data and electricity) should be surface-mounted.

In the rear area of the hub, the walls should preferably be made of concrete or equivalent wood. Some hub modules require a resilient option of fitting in the wall and the floor. Drywalls require an appropriate substructure for the attachment of the rental modules.

**High-quality lighting makes the room
look bright and friendly.**

Lighting, electrics and technology

Lighting should be motion-controlled, using high-quality linear luminaires or LED spotlights. The electrical power supply is provided by 230 V/50 Hz protection class I, and the power consumption depends on the mobility components. In addition, a pre-installation for an electrical outlet for the possible later installation of a surveillance camera is planned. The room needs a separate electricity meter for electricity billing purposed.

Connections such as LAN, router and DSL are required for communication technology to enable electronic closing, booking and payment systems. The wiring must reach as far as the rental hubs.

Technical implementation

In addition to the aspects that must be taken into account in the building construction planning by the architectural office, some technical points play an important role which must be considered and allowed for accordingly with regard to the lending process and subsequent operation.

Stable operating systems

It is important that industrial-grade components are used that have 24/7 operability. This applies not only to the rental items themselves, which must be designed for frequent use by different people. The electronic controls (controllers, internet gateways) are also specially developed and built for sharing and blocking control. Ideally, hardware and firmware would come from the same manufacturer.

Since the rental items are preferably stored in the building or at least covered areas for the purpose of preserving their value, it is not advisable to connect to the internet via radio solutions (LTE, GSM etc.). A connection via LAN guarantees a very high level of operational reliability and can relieve the burden on the IT department.

The internal communication with the individual rental modules, which is necessary from a technical point of view, provides the required operational reliability on the basis of wired CAN bus technology. Here, too, wireless solutions such as WLAN or Bluetooth® are not advisable.

Blocking and access technology

App-only solutions can lead to problems due to mobile phone reception situations in buildings. Instead, Münchner Wohnen relies on NFC (Near Field Communication) technology.

It guarantees functionality even without a direct connection to the internet and is compatible with other applications: These can be digital room access systems to, for example, coworking spaces, sharing cabinets or communal washing machines.

User and management software

An internet platform is needed on the part of both the operators and the users of the mobility hub. In order to guarantee operation with as little friction as possible, the software must be able to send differentiated automatic messages to both the building manager and the users (e.g. "loan period exceeded"). Furthermore, the software should be compatible with the software of other providers, such as car sharing, in order to enable an expansion of services. In order to meet the specific requirements of the housing industry, it should be possible to select individually scalable levels of authorisation and administration.
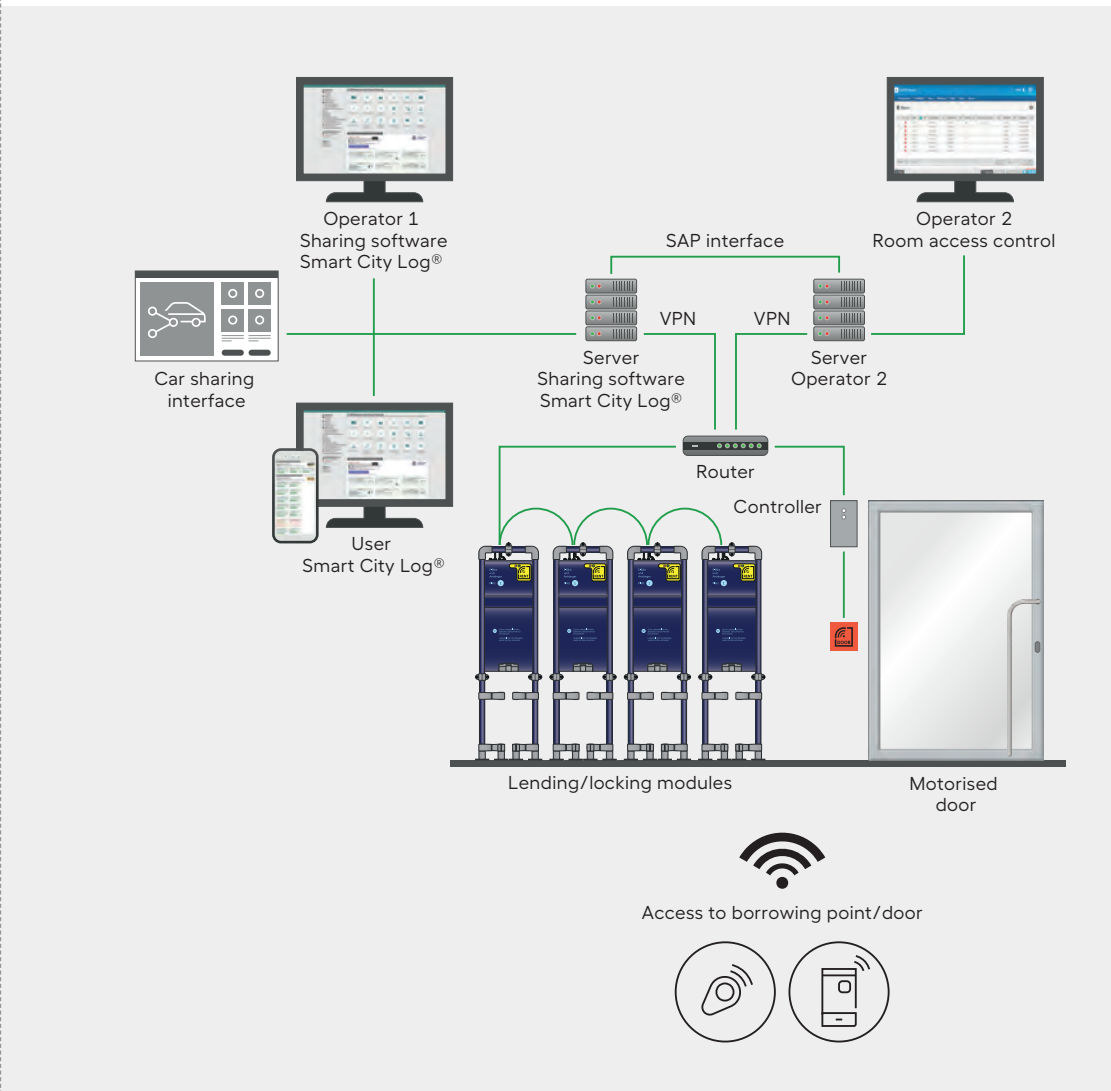
Development of IT networking of the rental modules and access control using the example of two separate administrative areas

Communication and commissioning

The be-all and end-all for the success of the mobility concept is a good communications strategy. The future residents must be involved, informed and spurred into action at an early stage so that they have the opportunity to integrate the various mobility offers into their everyday lives from the very beginning. It is worthwhile presenting the advantages of not having a car of one's own in concrete terms.

Münchner Wohnen relies on information in the course of advertising and allocating flats, introductory events, house notices and information letters. In Munich, tenants must be informed when they move in that it is a project with a mobility concept: fewer car parking spaces, but alternative mobility services in the sharing model.

The next step is to develop a well-thought-out communications strategy that consolidates the use of the mobility components on site: presence at tenants' parties, flyers and reports in the tenants' newspaper, as well as active mobility mentors who publicise the services on offer.

It is also very important to introduce people to the new services in order to break down any possible inhibitions.

"For the success of the entire mobility concept, successful communication of the mobility components on offer is just as important as the actual provision of the sharing services themselves. The participating employees of Münchner Wohnen will be present on site for the commissioning day, along with external sharing partners, the press and guests, and a catering company will provide light refreshments as well as sanitary and hygiene facilities. The presentation of the mobility components will be accompanied by proactive measures such as personal customer introductions and the bicycle service as well as the distribution of giveaways in the corporate design of Münchner Wohnen (crayons for children, bags, cups, saddle covers, pens, cycle bags etc.)."

Steffen Knopp, Mobility Manager
Sustainability and Climate Protection Section
Münchner Wohnen

The new services will be presented at the introductory event and can also be tried out then and there.

Extensive information materials and giveaways in the corporate design of Münchner Wohnen round off the information event.

08

Operation

User administration and borrowing process

Münchner Wohnen's mobility hubs are generally accessible around the clock; exceptions (e.g. due to maintenance) will be announced in good time. In many cases, an RFID chip (so-called "mobility chip" from Münchner Wohnen) is required to borrow the sharing components. The mobility chip behaves like a key – a simple touch of the chip on the word "Borrow" at the respective hub releases the lock, which releases the rental item, such as a bicycle trailer.

Borrowing is usually free of charge for tenants of Münchner Wohnen. Exceptions are car sharing vehicles and some publicly accessible bicycle rental hubs of Münchner Wohnen. The mobility chips will be issued to the eligible tenants when the flat is handed over (closed user group). The ten most important rules are explained and the "General Terms and Conditions of Use for the Mobility Components" are handed out.

The rental items can be reserved in advance via a website for 15 minutes and then borrowed for a maximum of 4 hours. In this way, Münchner Wohnen wants to make it possible for as many residents as possible to borrow items. The digital reservation function is optional, and the components can also be easily borrowed on site. After the rental, the vehicle or item is locked back at its hub and, if applicable, connected to the charging station.

The mobility chips will be issued to eligible tenants when the flat is handed over.

Ten instructions for use

The following ten important points will be communicated by the building manager to the tenants when handing over the mobility chips:

1. Remember that you are fully responsible for borrowed vehicles. Therefore, handle them carefully and under no circumstances pass on your mobility chip to unauthorised persons.
2. Repeated failure to follow the rules for using the mobility hub will result in your mobility chip being blocked. Then you will no longer have access.
3. "Something has happened …" – oh dear, but don't worry – it's not so bad: In order to be able to claim insurance cover in the event of damage, you must report the damage immediately to Münchner Wohnen and, if applicable, to your liability insurance company.
4. Unreported damage and wilful damage will be reported to the authorities.
5. The mobility components may only be used by persons aged 18 or over.
6. Do not entrust the mobility chip to children under any circumstances. The mobility hub is not a playground.
7. The maximum lending period is 4 hours.
8. Lock the bike outside the mobility hub. Do not forget to open the lock before resuming your journey, otherwise the spokes may be damaged.
9. Unplug the charging plug from the battery before removing the electric vehicle and plug it back in after your journey.
10. Riding cargo bikes is unfamiliar and takes practice. Ride slowly and carefully, and practise a little before transporting any loads.
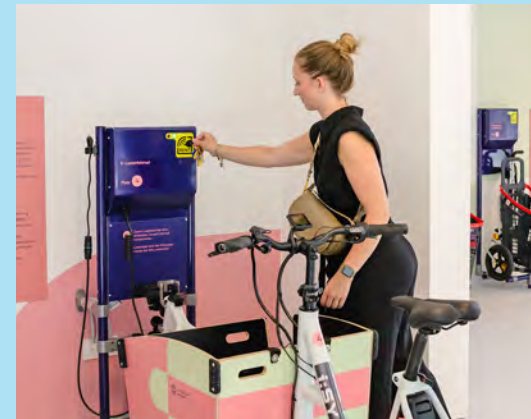
During the entire development process, conscious care was taken to ensure that the borrowing and returning process is easy and low-threshold for everyone.

Sponsorship, maintenance and care

The care, management and maintenance of the rental hubs, including mobility components, are carried out by the building managers and partly by the operators on the one hand. On the other hand, tenants from the participating estate may take their own initiative.

Mobility-savvy tenants are "recruited" to take over the sponsorship of "their" hub at the time of commissioning or registration itself. They help to bring the service closer to potential users and play an important role in the communication and mobility strategy of Münchner Wohnen.

If the premises or the mobility components provided give cause for complaint, the sponsors will take action and report any dirt, visible damage or the like. In the event of damage to a mobility component, they will inform the tenant service, which in turn will contacts the framework contract partner/maintenance and service. They can carry out minor work such as inflating tyres on site.

It is also possible to get them on board thematically in the event of later questions and surveys about the hub, for example by asking them about their (own) user behaviour or the special features of the hub.

In addition, the mobility hub is cleaned at regular intervals by an external framework contract partner/ cleaning service.

A cleaning service ensures the cleanliness of the hubs.

"I regularly pop into the mobility hub and check whether everything that can be borrowed here is being used properly and returned. I check the tyre pressures of the e-cargo bike and the trailer and, if necessary, I inflate the tyres again with the available air pump. However, if something major is damaged, I'll let Münchner Wohnen know."

Stephanie Drewing, sponsor of a Münchner Wohnen mobility hub

09
Evaluation

Usage and flexibility

For mobility concepts to be successful, the linchpin is how well they meet the mobility demands of the residents. The fast-moving nature of progress in technical mobility solutions and changes in everyday life and living conditions contribute to the fact that a mobility concept must remain flexible and adaptable. New means of transport become interesting, others may lose their importance. A change of workplace, the end of an apprenticeship or of one's working life can also change the distances travelled.

A continuous review of the intensity of use of the mobility components is therefore fundamental. In this way, the strengths and weaknesses of the mobility concept can be identified, changes in user behaviour or in the mobility services can be reacted to and, if necessary, components can be adapted and replaced.
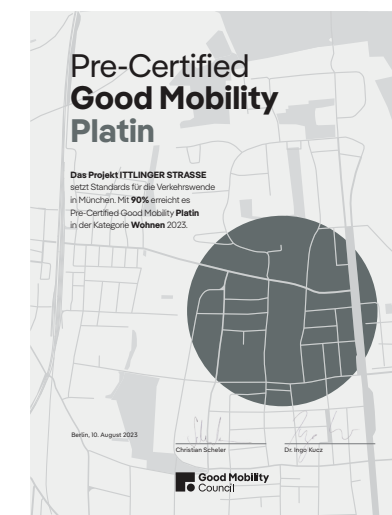
With the form "Mobility Concepts", mobility concepts on private property in Munich are safeguarded under building law. The builder or the owners are obliged to verify the operation and utilisation of the mobility elements at regular intervals. Accordingly, data collection and verification must take place at least every 1, 4, 7 and 10 years after the building has started to be used. In an online form provided by the City of Munich, the builder must enter the data in accordance with the fixed verification scheme.

With a view to consolidating mobility measures, the issue of evaluation was considered by Münchner Wohnen from the very beginning. For this reason, it was possible to carry out regular data evaluations at the very first mobility hub in Munich's Ramersdorf district, which opened in 2020. Over time, a steady increase in the intensity of use is encouragingly noticeable (please see the next page).

In the course of the findings from the review of usage intensities, Münchner Wohnen has already initiated the first adjustments. Individual, less popular mobility components have been replaced by those that are in high demand: For example, one of several existing bicycle trailers has been replaced by a new, attractive e-cargo bike. There was also an exchange with regard to user-friendliness: for example, an e-cargo bike was replaced by an easier-to-use pedelec with a permanently installed bicycle trailer. Subsequently, the use increased rapidly in this case, too, which may be due to a lower inhibition threshold when it comes to a pedelec.

In summary, both a regular evaluation of the usage data and personal contact with the user community and the mobility mentors are crucial for the adjustments.

Certification of mobility hubs

Pre-Certified
**Good Mobility
Platin**

Das Projekt ITTLINGER STRASSE
setzt Standards für die Verkehrswende
in München. Mit **90%** erreicht es
Pre-Certified Good Mobility **Platin**
in der Kategorie **Wohnen** 2023.

Berlin, 10. August 2023

Christian Scheler   Dr. Ingo Kucz

Good Mobility
Council

The certification system of the Good Mobility Council GmbH takes into account location-specific conditions as well as political framework conditions and industry developments.

The aim is to certify buildings of all types as part of the mobility transition: from residential to office and retail shops to districts and mobility hubs.[29]

For example, the two mobility hubs of Münchner Wohnen in Ittlingerstraße were also successfully pre-certified in 2023:

"The ITTLINGERSTRASSE project sets standards for the traffic transition in Munich. At 90%, it was awarded Pre-Certified Good Mobility Platinum in the residential category in 2023."

Evaluation of usage data

On the basis of continuous data collection, the mobility hubs can be evaluated at regular intervals. This is also important for reporting to the City of Munich. Together with the operators of the mobility components, Münchner Wohnen has developed a suitable presentation for its own evaluations.

In addition to the intensity of use, the respective borrowing period and the repeated uses of the individual mobility components are displayed.

The following evaluations show a total of 8 representative locations in Munich in 2024.

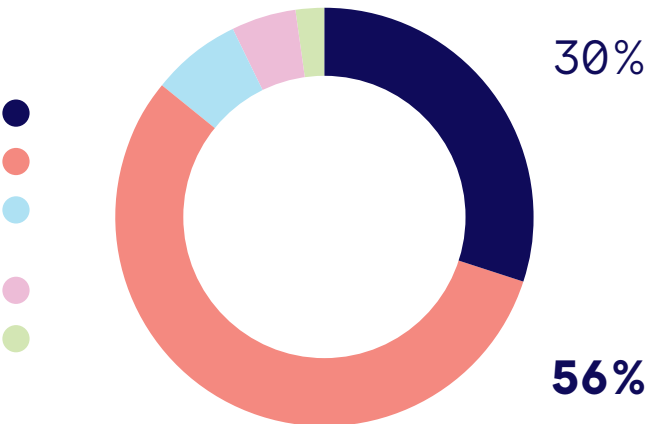The total number of the following items of equipment is available at the 8 hubs:
• 16 e-cargo bikes
• 8 pedelecs with trailer
• 16 bicycle trailers/handcarts
• 8 sack trucks
• 8 ladders

982 residential units are entitled to use the equipment in the evaluation presented. The rental period is limited to 4 hours for users.

Encouragingly, a steady increase in usage has been recorded since the opening of the first hub. According to an internal survey of tenants, the higher frequency of use of the pedelec with a trailer compared to the e-cargo bike is due to the low-threshold and familiar accessibility of the pedelec by analogy with one's own private bicycle.
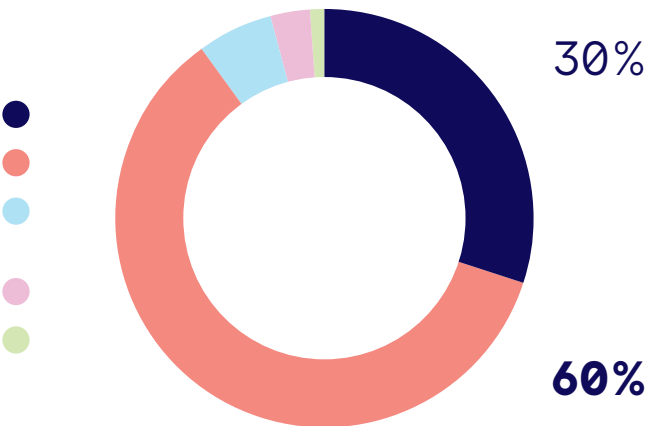
Borrowing times during the year (2024)

2024	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hours	88	145	502	612	1,678	2,223	1,945	2,193	2,212	1,499	165	100

Total	13,362

The illustration shows a seasonal reduction in the rental period in the cold winter months.
However, all mobility components, including the bicycle-based elements pedelec and e-cargo bike, are over the new year period, just to a much lesser extent than in the warmer months.

Use by type of rental item (2024)

	Rentals	Rentals/ rental item	Proportion	
E-cargo bikes	3,908	244.25	30%	●
Pedelecs with trailer	3,701	462.63	56%	●
Bicycle trailers/ handcarts	902	56.38	7%	●
Sack trucks	361	45.13	5%	●
Ladders	120	15.00	2%	●
Total	8,992			

30%
56%

Repeated usage per year (2024)

Frequency of use	Proportion of active households	
> 100 times	18%	
> 50 times	17%	
> 20 times	38%	
> 10 times	10%	
< 10 times	17%	

Borrowing times during the year (2024)

	Hours	Hours/ rental item	Proportion	
E-cargo bikes	5,939	371.19	30%	●
Pedelecs with trailer	5,870	733.75	60%	●
Bicycle trailers/ handcarts	1,123	70.19	6%	●
Sack trucks	302	37.75	3%	●
Ladders	128	16.00	1%	●
Total	13,362			

30%
60%

Registrations at a mobility hub (2024)

23.42%

230 active registrations out of 982 eligible households

Issues of viability

Reducing the number of car parking spaces through mobility concepts saves resources and can still ensure needs-based mobility in the immediate residential environment. As already described, there are numerous good reasons for the implementation:
- Active reduction in the embodied grey energy
- Larger infiltration area on the property:
  Risk of flooding is minimised
- More large trees planted and maintained:
  Providing shade, better air quality, reduction of heat development in the summer
- More green spaces:
  better microclimate, better quality of life
- Artesian groundwater pressure as a limiting factor
- Municipal requirements: Development plans, land purchase contracts etc.
- In previous projects of Münchner Wohnen without a mobility hub, regularly unused capacities for car parking spaces
  (up to 30% empty in the garages)

- High construction costs of underground parking spaces
- High repair costs for double-storey underground car parks
- High maintenance and repair costs and poor acceptance by duplex parkers.
  High building density and thus increasing FSI numbers make it difficult to provide a normal parking permit on an underground car park level without duplex parkers.

In the profitability assessment, Münchner Wohnen takes various factors into account:
- Space consumption of the mobility components in comparison with the parking spaces saved in the underground car park
- Loss of rental income from the unbuilt car parking spaces and the area of the mobility hub
- Maintenance costs over the useful life (maintenance, service, new procurement)
- Coordination effort (planners, authorities, associates, providers etc.)
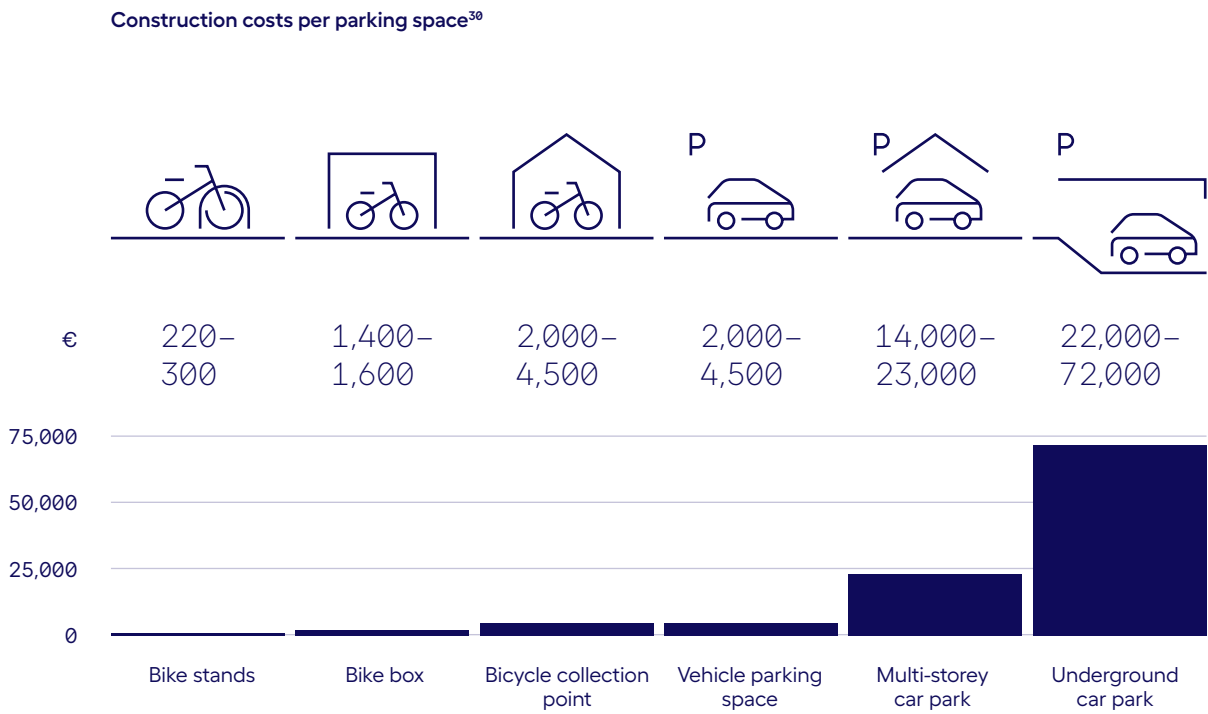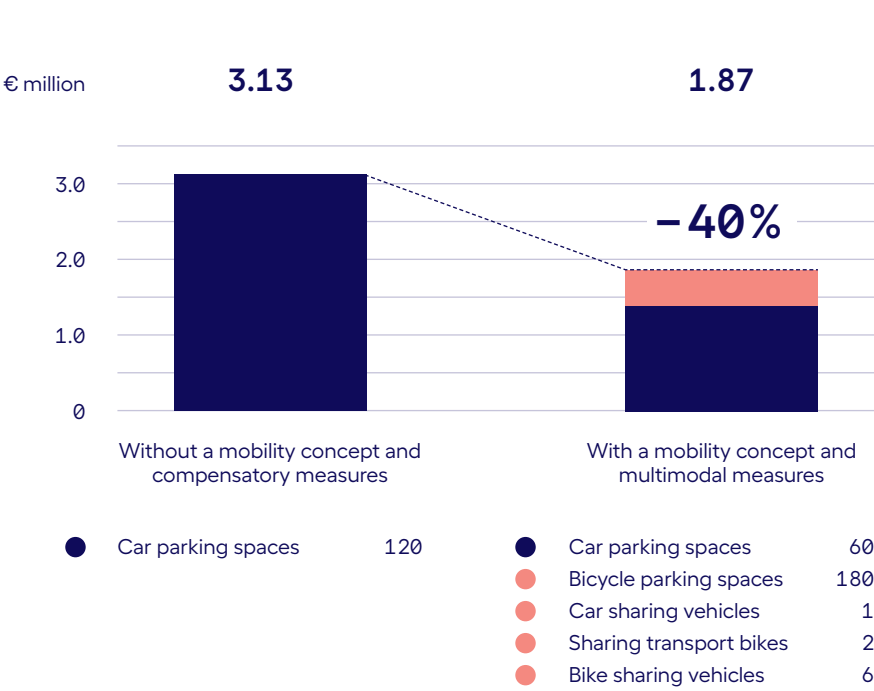
Münchner Wohnen has carried out a profitability calculation which states that, from a certain size of construction project upwards, depending on the type of funding, the structural compensation measures with a mobility concept are worthwhile compared to underground parking spaces that are not absolutely necessary, including ongoing operating and financing costs. With an average production cost of 60,000 euros per underground parking space (as of 2024), an appropriate reduction in parking spaces in the underground car park by courtesy of a mobility concept is positive from an economic point of view.

The cost of a mobility hub built with the system described above is also related to its size and equipment. On the one hand, the non-profit housing associations achieve high savings through the reduction in parking spaces, but on the other hand, they are confronted with the requirements of an ongoing sharing operation. It is important to keep the time and economic expenditure of the sharing operation as low as possible for all affected departments of a housing association.

Accordingly, there must be no excessive additional strain on the human resources. This principle is essential because, if it does not happen, there will be great time and economic expenditure which, sooner or later, will lead to severe restrictions or the closure of services.

In the case of structural measures in existing buildings, "grandfathering" (preservation of the status quo) applies as long as no further building rights are generated. Accordingly, no new parking spaces are to be built. There is thus no direct refinancing through a reduction in construction costs for parking spaces.

Construction costs per parking space[30]

	Bike stands	Bike box	Bicycle collection point	Vehicle parking space	Multi-storey car park	Underground car park
€	220–300	1,400–1,600	2,000–4,500	2,000–4,500	14,000–23,000	22,000–72,000

Effect of a mobility concept

€ million

3.13 Without a mobility concept and compensatory measures

1.87 With a mobility concept and multimodal measures

−40%

Without a mobility concept and compensatory measures		With a mobility concept and multimodal measures	
Car parking spaces	120	Car parking spaces	60
		Bicycle parking spaces	180
		Car sharing vehicles	1
		Sharing transport bikes	2
		Bike sharing vehicles	6

The costs in residential construction can be drastically reduced with a mobility concept (parking space reduction and compensatory measures).

Example calculation for 60 residential units. Model calculation including investment costs and 10 years of operating costs, based on the remodelled mobility ordinance of the market town of Feldkirchen near Graz.[31]

Next steps

The concept of mobility hubs described in this booklet provides the basis for further structural forms and developments. The specific requirements for this come directly from the practice of urban planners and the housing industry.

The range of services is very broad and ranges from simplified solutions for smaller sharing communities to highly flexible, modular and mobile systems.

Below, two different types of design are described as examples which are in the implementation phase at Münchner Wohnen.

"In addition to energy efficiency and a sustainable heating supply, we are also looking at other fields of action such as alternative mobility services in our districts, the relevance of grey energy in the selection of building materials and the adaptation of our properties to the consequences of climate change."

Stefan Feller, Head of Climate Protection Measures
at the Sustainability and Climate Protection Section
of Münchner Wohnen

Design for smaller sharing communities
For a smaller number of users, a simplified version of the system may be expedient:
- There are no specific parking spaces and no fixtures for the rental items.
- The sharing of the rental items is handled via the automated issue of keys (e.g. for a bicycle frame lock). The lending process is controlled via an internet sharing platform and is trackable.
- The keys are issued from an automatic dispenser. This design means lower installation and running costs compared to the previously implemented set-up.
- On the platform, registered users can use their (specific) RFID card to remove or return the keys via the automatic dispenser.
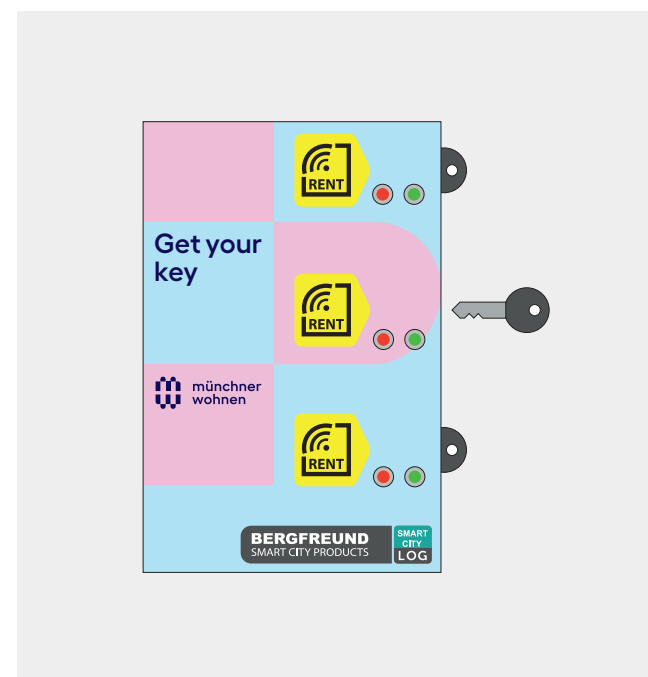
Sketch of an automatic key dispenser

Mobility hub in mobile spaces
This design variant is used, for example, when there is limited space such as in existing properties, renovations or in the case of temporary mobility hubs:
- The mobility hub is housed in a container equipped for this purpose.
- The design (windows, doors etc.) can be individually adapted, ranging from the simplest (inexpensive) equipment to comfortable multi-purpose rooms with automatic doors and digital access control.
- The size of the mobility hub can be easily varied and combined according to the local conditions due to the standardised container dimensions.
- The mobility hub has the same features and capabilities as solutions housed in buildings.
- The mobile variant of a mobility hub can be moved to the next destination after the end of the specific temporary need (e.g. renovation of an underground car park).

Communications strategy
In addition to the further development of the mobility hubs, Münchner Wohnen will continue to expand its communications strategy in the future. In terms of content, the aim is to inspire users about this issue in the long term, to encourage them to participate and to change mobility behaviour in favour of the mobility transition in the district.

The decisive factor is the comprehensive and permanent introduction to the new mobility services, adapted to suit the target group. With the practice-orientated introduction, uncertainties can be eliminated and the acceptance of new forms of mobility can be encouraged. Due to a turnover of tenants and changes in the living situations and attitudes of the residents, communicative elements must be permanently integrated into the operation of the mobility concept.

Apart from booklets and information material, information events for testing and trying out the vehicles are particularly suitable in order to break down inhibitions and to be able to respond to questions or uncertainties. Digital information boards at prominent locations, such as the entrance halls and easily visible places in the district, could provide information about local public transport departure times and vehicle availability and can also include information from the building manager.

Events, days of action or outreach work around the district can accompany the measures described above at regular intervals and cover different services. From information stands set up by the mobility providers to cargo bike courses to bicycle repair campaigns, many things are possible.

In addition to the content-related issues, digital accessibility within the booking platform and at the operating terminals will also have a part to play in the future.

12
Outlook

While there continues to be a lot of internal work going on to improve the range of services on the one hand, Münchner Wohnen is also committed to promoting affordable housing, sustainable development and future-proof mobility at the political level.

"Issues such as transformation management, social innovation and changes in (mobility) behaviour can only succeed if they are well taken care of – this is something that Münchner Wohnen has grasped. After all, the new mobility hubs offer a good place to identify with these issues, to live and to initiate a rethink."

Steffen Knopp, Mobility Manager
Sustainability and Climate Protection Section
Münchner Wohnen

Together with various stakeholders, such as the city administration, various committees and networks as well as citizens' initiatives, Münchner Wohnen is addressing the important issues of today:

• How can the necessary weighing of values (affordable housing vs. car parking spaces) take place in a transparent and, in particular, future-orientated way?
• How can we manage to look at different urban locations and urban planning situations in an even more differentiated way in the formal process?
• Could mobility planning also be used as a strategic tool, e.g. parking permits in the sense of overarching urban goals?
• What significance and tasks can centralised district garages take on in the future in the context of the city as a whole?
• How can private and public sharing services be coordinated and combined as part of a city-wide mobility network?
• How can we identify and prepare for mobility needs in urban planning at an early stage?
• How can appropriate mobility goals be implemented even more consistently?
• And last but not least: How can the financing be distributed fairly on broader shoulders? What opportunities do mobility funds offer?

And so there will always be tasks worth tackling …

13

Thinking outside the box

This booklet presents the concrete approach of Münchner Wohnen and therefore deals with its special framework conditions, prerequisites and solutions. The questions posed in Chapter 5 (Section: Selection of service providers) can and must of course be answered individually, depending on the project.

Accordingly, there must be various requirements for the implementation and operation. Not least for these reasons, the service providers currently available on the market have focused on different priorities.

In order to take this spectrum into account to some extent, we would like to present further variants for the implementation of mobility hubs in other projects, using the following examples from various Munich districts.

Example: Neuhausen

Highlights

A new service has been created in the existing building, and it can be used uncovered outdoors all year round. The eye-catching implementation guarantees good visibility and permanently installed hubs with inductive charging simplify returns. A revenue share for the owner – the municipal housing association – helps to partially refinance acquisition and management costs.

What can be used?

E-cargo bikes

Who can borrow items?

Anyone who is logged in to the provider's associated app, i.e. supra-regional availability.

How can the items be borrowed?

By app

Implementation drivers

Owner (municipal housing association), provider of e-cargo bikes. In this case, also the city policy – it is a support measure of the municipal housing association as part of the introduction of parking licence zones. Implementation by sigo green GmbH.

Example: Gern

Highlights

It is a new, diverse range of different transport solutions in the new building, which can be used all year round. The location is covered and outdoors. The key issue works via a multifunctional sharing cabinet, while the booking takes place via a website. The website also provides other functions of a district app, such as room hire.

What can be used?

E-cargo bikes, heavy-duty trailers, box trailers, shopping trolleys, e-car sharing, bicycle repair hubs

Who can borrow items?

Currently closed user group of residents and the local neighbourhood (extended closed user group). Open use is possible in principle.

How can the items be borrowed?

Sharing cabinet, website

Implementation drivers

Owner (municipal housing association) as part of a new construction project with an ambitious mobility concept to reduce parking spaces. Implementation by Isarwatt eG.

Example: Fürstenried-West

Highlights

Due to a long conversion phase in an existing district (densification and renovation), a flexible solution was implemented, i.e. the hubs can "wander" around the district. The cargo bike hubs are clearly visible outside and are supplied with 100% PV electricity (including battery storage) via PV modules independent of the grid. This enables uncomplicated relocation of the hubs. They are not located in the building, but are nevertheless covered.

What can be used?

E-car, e-cargo bike and e-scooter sharing

Who can borrow items?

People from the entire district and surrounding streets (extended closed user group). Residents can choose between a flexible subscription with no monthly costs or a premium subscription with low usage fees and a cargo bike flat rate.

How can the items be borrowed?

After a one-off registration, all services can be booked in a digital app. Access systems such as doors, lockers and bicycle locks can also be controlled via the app.

Implementation drivers

As part of the densification measure on the part of the owner and project sponsor (Bayerische Versorgungskammer [Bavarian Pension Fund], project development and construction by Hines). The project developer has developed a concept together with überall GmbH. Construction and operation were carried out entirely by überall GmbH.

Example: Laim

Highlights

Here, a new service was implemented in the new building. The planning, construction and operation are all from a single source: The services at the mobility hub are designed and operated by one provider. The project developer sets the rental prices and offers various incentives for use (voucher codes when moving in etc.). There are also regular information events. The user revenues are then offset against the facility fee for the service.

What can be used?

E-car sharing (compact and estate cars), pedelecs, e-cargo bikes

Who can borrow items?

People from the entire district and surrounding streets. Access to the underground car park is enabled via an access code in the app.

How can the items be borrowed?

Users can rent all vehicle types around the clock and without keys via the booking app provided.

Implementation drivers

The project developer has developed a mobility concept together with eVehicle for you GmbH. Construction and operation were carried out entirely by evhcle.

List of abbreviations

NFC
Near Field Communication

PV
Photovoltaics

RFID
Radio Frequency Identification

Photo credits

Frank Schroth (p. 1, p. 11, p. 12, p. 17, p. 18, p. 22, p. 23 top, p. 28, p. 29, p. 31, p. 34, p. 35, p. 36, p. 38 bottom, p. 39, p. 40, p. 41, p. 42 top, p. 50)
Tobias Hase / MOR LHM (City of Munich Mobility Department) (p. 4)
Jonas Nefzger (p. 5, p. 8, p. 27 top, p. 33, p. 38 top)
eVehicle for you GmbH (p. 13, p. 53 right)
Lang Hugger Rampp | Adldinger (p. 23 bottom)
Bergfreund Smart City Products GmbH, Austria, bergfreund.com (p. 27 bottom, p. 37, p. 48)
ediundsepp Gestaltungsgesellschaft mbH (design agency) (p. 30)
Stefan Müller-Naumann (p. 42 bottom)
Good Mobility Council GmbH (p. 43)
Stefan Feller (p. 52, p. 53 left)
Felix Weiss / überall GmbH (p. 53 centre)

List of footnotes

1 Federal Ministry of Digital and Transport, 2025a; Federal Ministry of Digital and Transport, 2025b
2 Agora Verkehrswende [transport transition], 2017, page 15
3 Supreme Building Authority in the Bavarian State Ministry for the Interior, Building and Transport, 2017
4 Agora Verkehrswende, 2023, page 3f
5 PTV Planung Transport Verkehr GmbH, 2023
6 Rammler, S. and Schwedes, O., 2019, page 10
7 Agora Verkehrswende, 2017, page 15
8 Hubrich, S. et al., 2024, page 4
9 Hubrich, S. et al., 2024, page 2
10 Statista GmbH, 2025; Hubrich, S. et al., 2024, page 2
11 Federal Environment Agency, 2024
12 Löster, N., 2022
13 Hubrich, S. et al., 2024, page 2
14 Heilmeier, Ch., 2024
15 Agora Verkehrswende, 2017, page 15
16 Stein, T. and Bauer, U., 2019, page 6
17 Federal Environment Agency, 2023
18 Nobis, C. and Kuhnimhof, T., 2018, page 4
19 City of Munich, 2025a
20 City of Munich, n.d.
21 City of Munich, 2021
22 City of Munich, 2021; City of Munich, 2024; City of Munich, 2025b
23 Hubrich, S. et al., 2024, page 2; Follmer, R. and Belz, J., 2018, page 9
24 City of Munich, 2013
25 City of Munich, 2013; City of Munich, 2023b
26 City of Munich, 2023a
27 State Office for Digitalisation, Broadband and Surveying, n.d.
28 Nehrke, G., n.d., page 4
29 Good Mobility Council GmbH, n.d.
30 VCD, 2021, page 2
31 VCÖ, 2024

List of references

Agora Verkehrswende (2017): Safeguarding the mobility of tomorrow with the transport transition. 12 theses on the transport transition. Berlin

Agora Verkehrswende (2023): Mobility poverty in Germany. Approaching an underestimated problem with solution perspectives for greater social inclusion and climate protection. Berlin

City of Munich (n.d.):
Degree of motorisation of passenger cars. https://opendata.muenchen.de/es/dataset/indikatorenatlas-verkehr-motorisierungs-grad-personenkraftwagen-83r65mct/resource/627ff66d-010b-4e37-9509-d68646ba7a6f, last accessed on 21 March 2025

City of Munich (2013):
Meeting documents no. 08-14 / V 13593. https://risi.muenchen.de/risi/dokument/v/3163763, last accessed on 2 April 2025

City of Munich (2021):
Meeting documents no. 20-26 / V 03507. https://risi.muenchen.de/risi/dokument/v/6625968, last accessed on 2 April 2025

City of Munich (2023a):
Mobility concepts in residential construction. Of necessary parking spaces and alternative mobility components. https://cdn.muenchenunterwegs.de/live/static-content/mobilitaetskonzepte/Leitfaden-Wohnungswirtschaft_final.pdf, last accessed on 2 April 2025

City of Munich (2023b):
Mobility concept. compact – concrete – binding. Attachment to the parking permit. https://stadt.muenchen.de/dam/jcr:7bc984e1-83f0-4215-ae04-594fd6b03fc4/Mobilitaetskonzept_2023_form.pdf, last accessed on 2 April 2025

City of Munich (2024): 2035.
The mobility strategy of the City of Munich. Munich

City of Munich (2025a):
Mobility points. Mobility in a nutshell. https://muenchenunterwegs.de/mp, last accessed on 2 April 2025

City of Munich (2025b):
Mobility Strategy 2035. Munich's roadmap for the transport transition. https://muenchenunterwegs.de/2035, last accessed on 2 April 2025

Federal Environment Agency (2023): Mobility concepts for sustainable urban transport in 2050: Meta-analysis, measures and strategies. Dessau-Roßlau

Federal Environment Agency (2024): Cycling. https://www.umweltbundesamt.de/themen/verkehr/nachhaltige-mobilitaet/radverkehr#vorteile-des-fahrradfahrens, last accessed on 2 April 2025

Federal Ministry of Digital and Transport (2025a): Promotion of non-investment pilot projects for the implementation of the NCP. https://bmdv.bund.de/SharedDocs/DE/Artikel/StV/Radverkehr/nicht-investive-modellprojekte.html, last accessed on 2 April 2025

Federal Ministry for Digital and Transport (2025b): National Cycling Plan 3.0. https://bmdv.bund.de/SharedDocs/DE/Artikel/StV/Radverkehr/nationaler-radverkehrsplan-3-0.html, last accessed on 2 April 2025

Follmer, R. and Belz, J. (2018): Mobility in Germany – MiD Short Report – City of Munich, Munich environs and MVV (Munich Transport and Tariff Association) Network Area. Study by infas, DLR, IVT and infas 360 on behalf of the Federal Minister of Transport and Digital Infrastructure (FE no. 70.904/15). Bonn, Berlin

Good Mobility Council GmbH (n.d.):
Selected projects. https://goodmobility.org/projekte, last accessed on 2 July 2025

Heilmeier, Ch. (2024): The Long Road to the Transition. https://urban-matters.de/magazin/der-lange-weg-zur-wende/, last accessed on 2 April 2025

Hubrich, S. et al. (2024): Mobility in Towns &Cities – SrV 2023. Mobility profile for Munich. Dresden

Löster, N. (2022): Climate protection in transport. Three quarters of all journeys begin or end on your own doorstep. https://www.vcd.org/artikel/wohnen-und-mobilitaet-klimaschutz-im-verkehr, last accessed on 2 April 2025 after Gerike, R. et al. (2020): Special evaluation of the research project "Mobility in Towns & Cities – SrV (System of Representative Traffic Surveys) 2018". City group: Large SrV comparison towns & cities. Dresden

Nehrke, G. (n.d.): Traffic relief through car sharing. Fact Sheet of the Bundesverband Carsharing e.V. Berlin (Federal Association)

Nobis, C. and Kuhnimhof, T. (2018): Mobility in Germany – MiD Result Report. Study by infas, DLR, IVT and infas 360 on behalf of the Federal Minister of Transport and Digital Infrastructure (FE no. 70.904/15). Bonn, Berlin

PTV Planung Transport Verkehr GmbH (2023) (Planning Transport Traffic): Why mobility must be diverse and inclusive. https://blog.ptvgroup.com/de/stadt-und-mobilitaet/warum-mobilitaet-divers-und-inklusiv-sein-muss/, last accessed on 30 July 2024

Rammler, S. and Schwedes, O. (2019): Mobility for all! Thoughts on the Fairness Gap in Mobility Policy. Berlin

Regional Office for Digitisation, Broadband and Surveying (n.d.): Hausumringe Bayern (Open Data). https://geodaten.bayern.de/opengeodata/OpenDataDetail.html?pn=hausumringe, licence: CC BY 4.0, supplemented by own content, last accessed on 11 October 2024

Statista GmbH (2025): Number of passenger cars in the city of Munich from 2011 to 2024. https://de.statista.com/statistik/daten/studie/1107736/umfrage/bestand-an-pkw-in-der-stadt-muenchen/, last accessed on 2 April 2025

Stein, T. and Bauer, U. (2019): Mobility hubs in municipal practice. Findings and experiences from the BMU research project City2Share and other municipal practical examples. 2. City2Share discussion paper. Berlin

Supreme building authority in the Bavarian State Ministry for the Interior, Building and Transport (2017): Building sustainably together. Research report on the ecological study of the cooperative housing project wagnisART. Munich

VCD (Automobile Club of Germany) (2021): More space for bikes. Cycle parking. Berlin according to the BBSR (Federal Institute for Research on Building, Urban Affairs and Spatial Development) (2017): Calculation of cost increases on the basis of the BKI (Building Costs Information Centre of the Chamber of Architects) 2022

VCÖ (Automobile Club of Austria) (2024): Comprehensively reforming parking space requirements. https://vcoe.at/publikationen/vcoe-factsheets/detail/stellplatzvorgaben-umfassend-reformieren, last accessed on 7 April 2025 after Verkehrplus (2024): Own calculations based on the Feldkirchen bei Graz Mobility Ordinance. Graz