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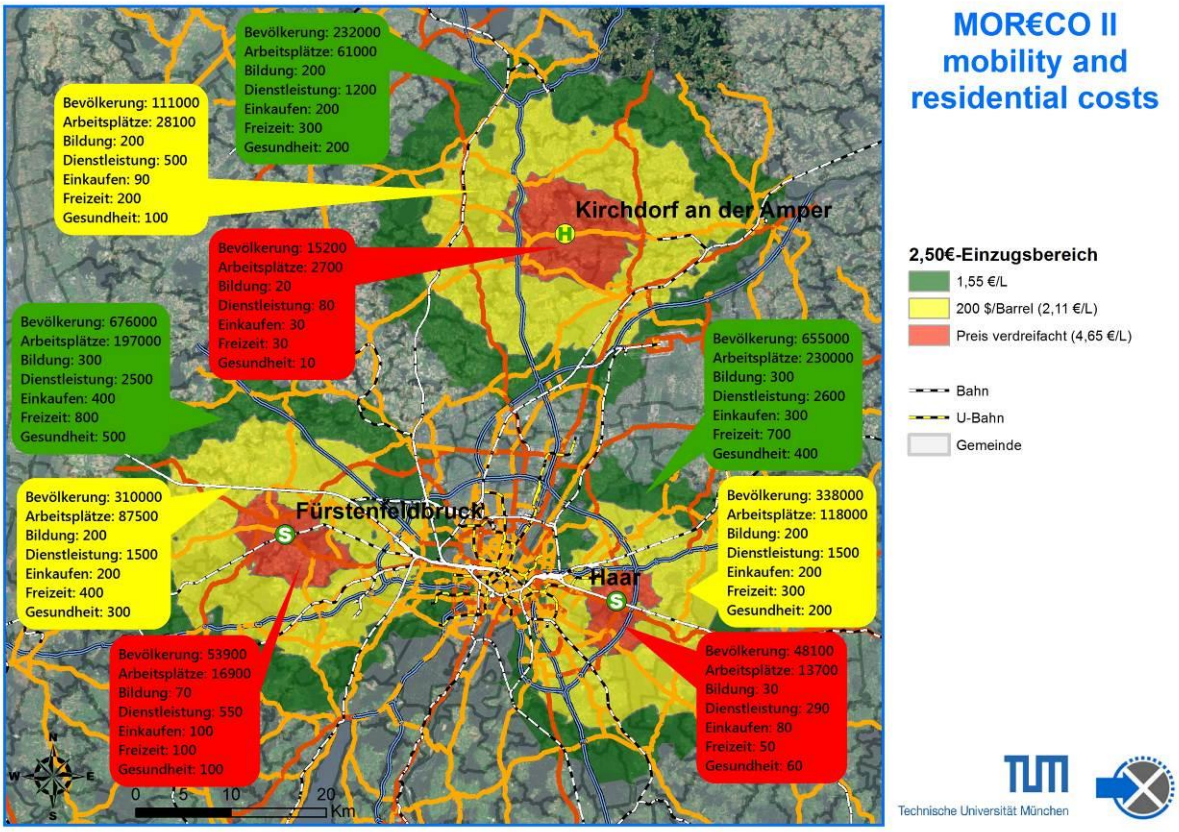
MOR€CO II

Recommendations for decision-makers to respond to increasing mobility costs in the Munich Region

The growth region of Munich is, in its own way, under pressure from both its housing market as well as the everyday mobility of its citizens. Rising land and rent prices are leading to an increased development of residential sites in peripheral locations and dispersed transport links on the regional level. This highlights an urgent need for coordinated control by decision-makers on the different scales of the Munich region.

Alongside the potential of rising mobility costs, the Munich region carries the significant risk of housing misallocation in relatively hard to reach locations on the regional level. Such issues are being exacerbated by the supply shortage of fossil fuels, political instability in oil-producing countries and energy price increases (in the context of the energy turnaround). Scenarios of which became a reality during the recent energy crisis and that will inevitably lead to increases in mobility costs (Büttner, Wulfhorst 2013).



Public decision-makers and actors at the local and regional level need to make provisions for the future and take into account increasing mobility costs in their decision-making processes for location and transport development. For this they need appropriate and accessible tools to be able to assess the possible effects of changes in mobility costs within the different areas of a region.

Study Framework

For this study, a special focus is placed on three municipalities: the city of Fürstenfeldbruck, the rural village of Kirchdorf an der Amper and the suburban municipality of Haar near Munich. A detailed presentation of the municipalities was purposely omitted from this study due to the analyses of the previous study "MOR€CO: Investigation of future living and mobility costs for households in the Munich region" (Büttner, B., Wulfhorst, G, 2012).

Using the EMM Accessibility Atlas different catchment areas and their respective potentials were calculated. These potentials were based on a detailed investigations of the study municipalities and their surroundings, summarized to the categories of population, jobs, education, services, shopping, leisure and health.

In addition, the entire Munich region was complemented by the activities of the OSM dataset and then further aggregated. Accordingly, an extensive dataset was made available, as well as an in-depth analysis of the three study communities with the help of georeferenced activities (e.g., supermarkets, chemists, restaurants, etc).

The accessibility of the investigated areas was calculated based on each transport network. Using the EMM Accessibility Atlas, the mobility costs were implemented for both private motorized transport (PrT) as well as for public transport (PuT), with the monetary catchment areas having been calculated using Network Analyst in ArcGIS 10.0.

For a single journey (one-way), a budget of €2.50 per trip was accepted. In 2010, private transport expenditure, in terms of the Germany national average, amounted to €305; this value corresponds to 14% of private consumption expenditure (Federal Statistical Office 2013). In the districts around Munich almost one third of this expenditure is allocated to work and training purposes.

In the following analyses an average commuting distance was assumed, which equates to five working days and a commuting budget of €5 daily, €25 weekly and €100 monthly for the journeys that are related to work and training purposes. This budget corresponds to the commuter traffic share.

Current Situation and Outcomes

Fürstenfeldbruck

Figure 1 details the walking-based accessibility of the Fürstenfeldbruck S-Bahn (suburban train) station. The periphery of the station stands out due to the associated lack of activities that are able to be accessed by pedestrians. Sparsely located shopping opportunities can be accessed after a five minute walk from the station; however, the main activity focal point is located well outside the 15-minute pedestrian service area. Among the important educational institutions, which are located north-east of the S-Bahn station, pedestrians need between 10 to 15 minutes to reach these areas despite the distance of 500 meters being rather low.

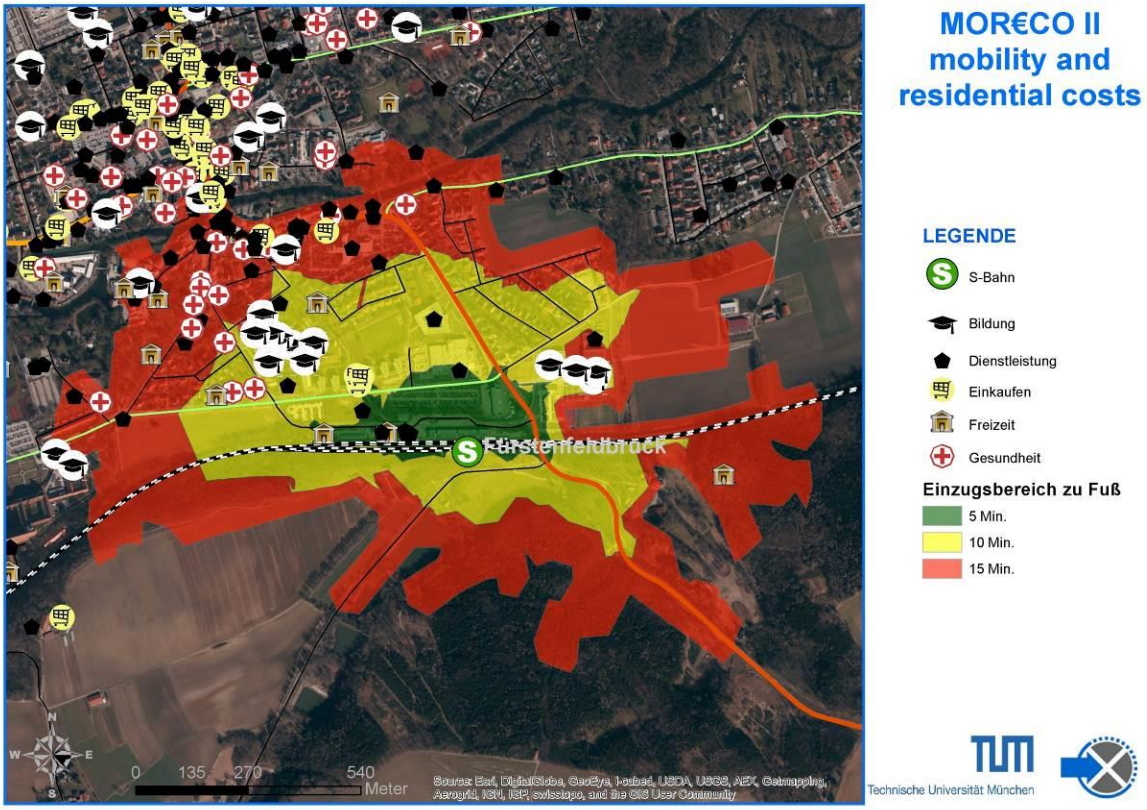


Figure 1: Pedestrian accessibility from the Fürstenfeldbruck S-Bahn station.

It is evident from the Figure 1 analysis that there are, relative to its periphery, very few activities in the pedestrian catchment area of the Fürstenfeldbruck S-Bahn station. A variety of shopping opportunities are located on the service area periphery in the city center. These opportunities can be accessed by pedestrians from the railway station in approximately a quarter of an hour.

In the case of private motorized and public transport accessibility, isocost analyses (shown in their entirety in the full MOR€CO II report) demonstrate PrT being able to cover three times more area compared to that of PuT – assuming a travel budget of €2.50 while conservatively taking into account solely operational costs (i.e., fuel costs at €1.55/L and a single ticket train fare). For this scenario, double the amount of population, jobs and shopping opportunities can be accessed by car, compared to public transport, with the western areas of Munich also being able to be reached.

Figure 2 highlights the car-based accessibility scenarios that involve fuel prices reaching $US 200/bbl as well as the drastic tripling of prices, scenarios all of which became a reality in the 2000s energy crisis in the US. With a moderate fuel price increase to €2.11/L ($US 200/bbl) just less than half the jobs and residents, with a budget of €2.50/day, are accessible by PrT. As a result, the potential of the City of Munich will no longer be accessible.

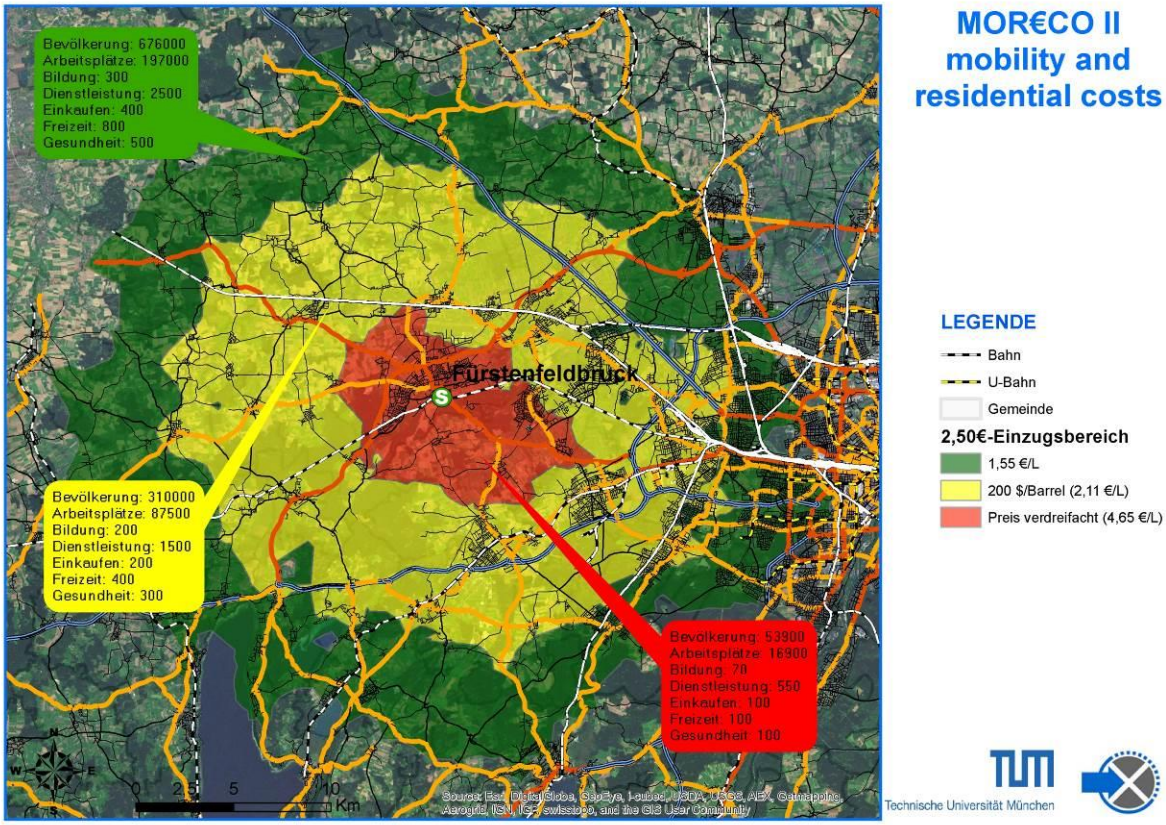


Figure 2: PrT accessibility for different fuel price hike scenarios in Fürstenfeldbruck

In the case of a tripling of fuel prices, the close surrounding areas of Munich will not be accessible (see Figure 2) and therefore only approximately 8% of the original population and job potentials are available. The tripling of fuel costs results in an expected increase in a one way ticket price from €2.50 to €3.50. Consequently, public transportation is not as strong as the PrT taken at this price increase, assuming that the tariff does not change. With a budget of €2.50 (short-trip), only public transport is accessible from within Fürstenfeldbruck. With a budget of € 3.50 more than double the workplaces, service providers, educational and recreational facilities are accessible.

Kirchdorf an der Amper

The rural town of Kirchdorf an der Amper, approximately 50 km to the north of Munich, has no S-Bahn connections within its periphery. Accordingly, the City Hall bus-station is seen as being the most important public transport stop. Figure 3 highlights pedestrian accessibility service areas within the small municipality, whereby it can be seen that all activities are accessible on foot within 15 minutes, with the majority being accessible within 10 minutes.

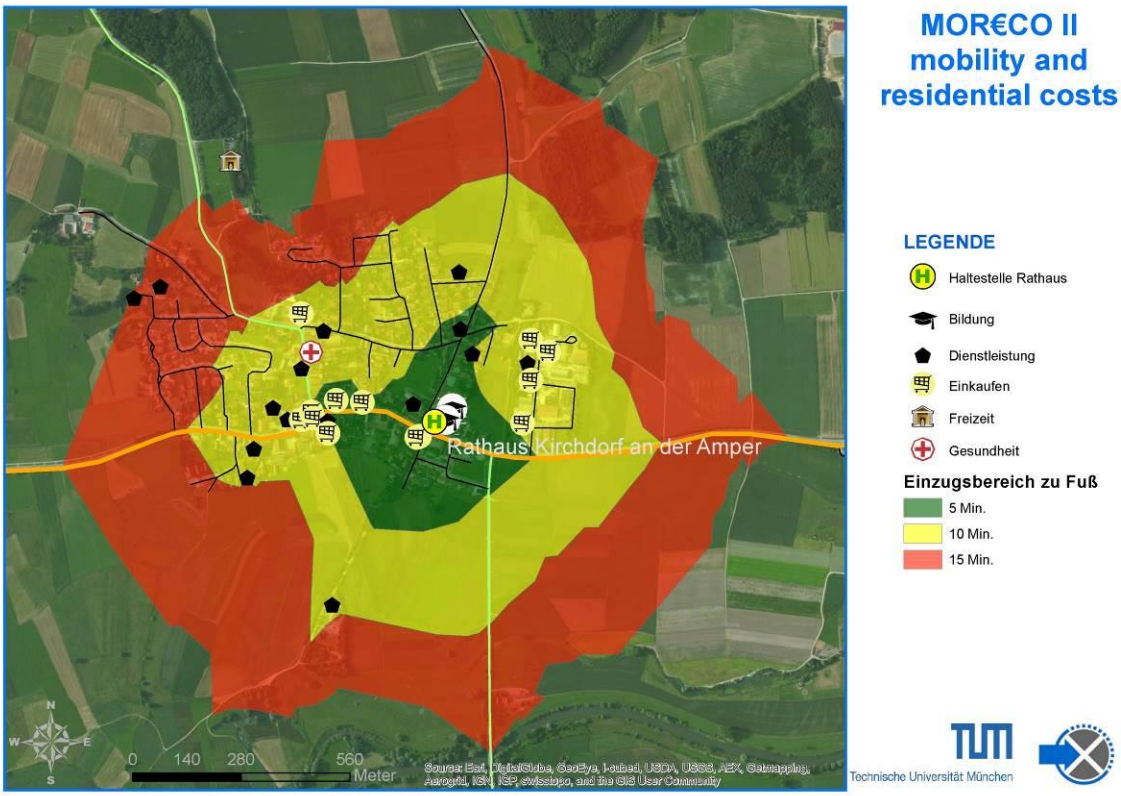


Figure 3: Pedestrian accessibility from the Kirchdorf an der Amper S-Bahn station.

Through the available regional buses, a relatively larger area is accessible. Both Freising and Munich Airport can be reached with only a single journey ticket of €2.50, however, the frequency of these services are rather small and irregular. Accordingly, the realistic availability of public transport is highly dependent on both the time of day and day of the week. By car, the municipalities of Neufahrn, Hallbergmoos and Eching, to the south of Kirchdorf an der Amper and to the north of Munich, are also accessible.

Figure 4 shows how a drastic fuel price increase in Kirchdorf an der Amper would affect the accessibility of activities. For the $US200/bbl scenario, more than half of the population, jobs, services and shopping would be inaccessible. In this region, the Munich Airport specifically plays a supporting role with its variety of activities, which would no longer be accessible even with such a moderate increase. The accessibility within the airport region is at significant risk with an increase in mobility costs.

In relation to the tripling of fuel costs, the percentage of public transport, taken at this price increase, is not as strongly affected as PrT. Accordingly, with a travel budget of €3.50 by public transport, more than double the population, jobs, services, shopping, leisure and health facilities are accessible (see full MOR€CO II report).

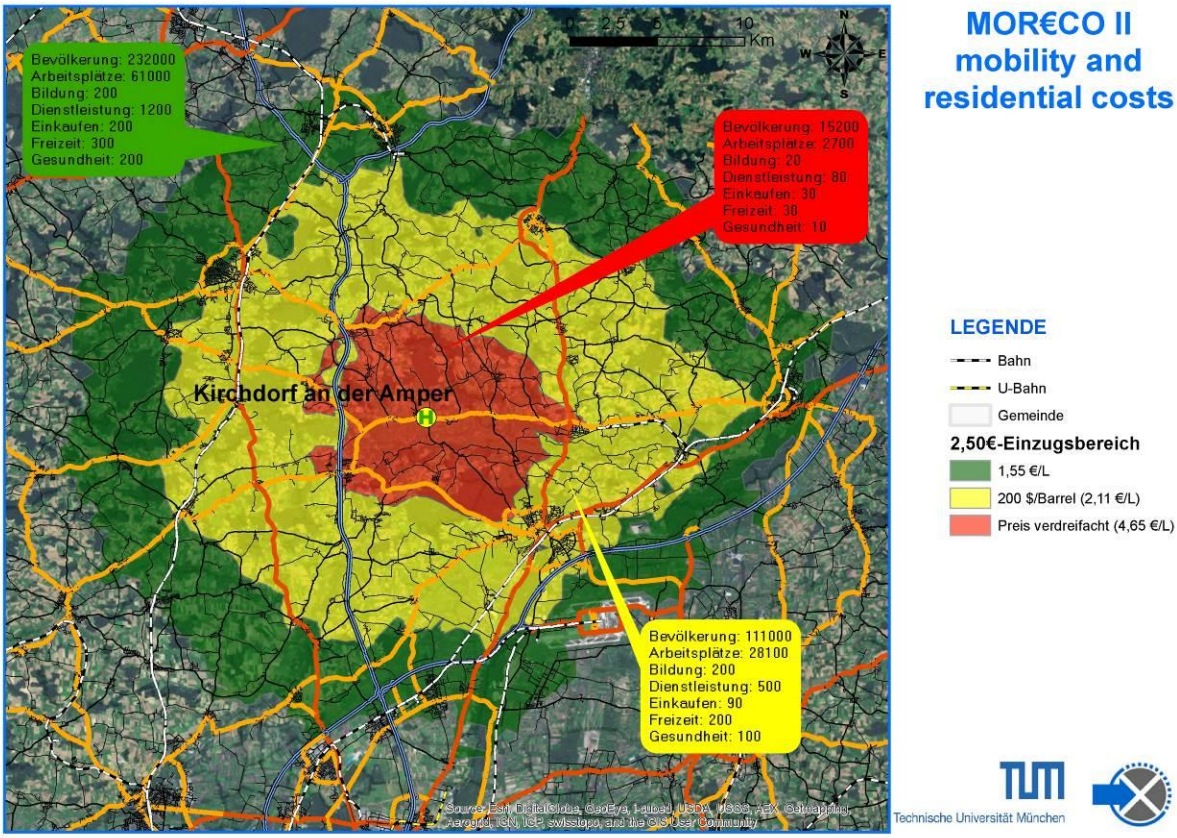


Figure 4: PrT accessibility for different fuel price hike scenarios in Kirchdorf an der Amper

The development of attractive and reliable public transport connections between land use priorities and work centre locations such as Munich Airport are necessary to make this region more resilient in terms of increasing mobility costs.

Haar near Munich

The suburban municipality of Haar near Munich, is distinguished by a high density of activities. The S-Bahn station is located north-east of the municipal centre, and accordingly, some activities to the west cannot be reached by pedestrians within 15 minutes. In the direct surroundings of the station, an urban upgrade involving a high utilization mix would bring about positive outcomes. Especially north of the S-Bahn station where there are only few gastronomy opportunities.

With such a large activity potential achievable by public transport, Haar is benefiting from its close proximity to the border of the city's inner and outer PuT tariff zones. With a single journey ticket, both tariff zones are able to be accessed, while strong rises in fuel consumption in dense and urban structures occur due to stop and go traffic at intersections. Accordingly, the potential of all achievable activities with PrT is already at least half that of public transport (see Figure 5). This is particularly clear, for population and jobs.

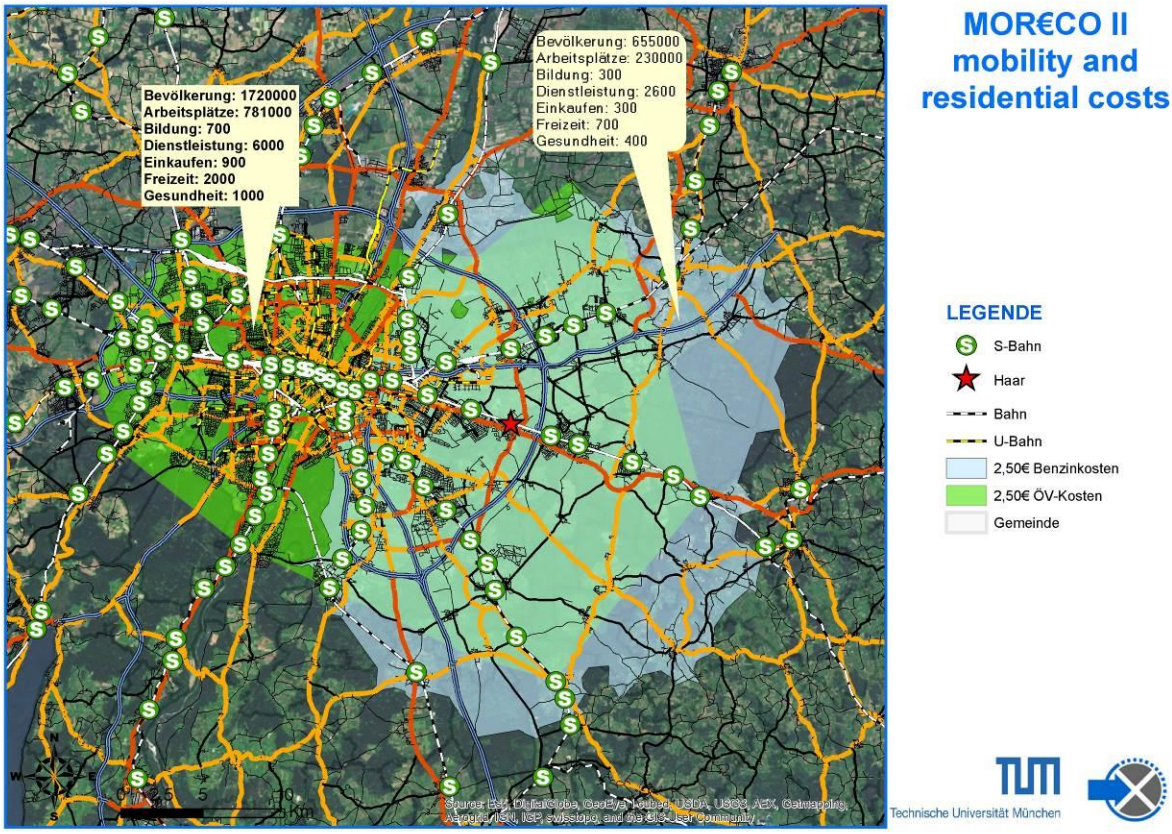


Figure 5: PrT and PuT accessibility in Haar near Munich

With the urban density of Munich acting as a mobility barrier, it is already almost impossible, with no fuel price spike at a budget of €2.50, to reach popular landmarks within the city by car (e.g., the Isar River). In the case of a drastic fuel spike scenario occurring, whereby prices rise to €2.11/L, car trips are no longer able to reach activity concentrations on the inner-city outskirts, but instead in Munich's suburban areas.

Haar benefits greatly from its very good public transport connections, specifically its two S-Bahn lines. Thanks to the dense and mixed land-use structure, coupled with a very good accessibility to public transport, Haar is relatively resistant to mobility cost increases.

With the tripling of fuel prices, public transport is able to access almost six times the population compared to fuel cost increase scenarios. In the case of workplaces seven times, shopping nine times, for education and health facilities and service providers ten times and recreational facilities even twenty times more.

Conclusions and Recommendations for Decision-makers

Based on the findings obtained from the analysis (see full MOR€CO II report: Chapter 3:) alongside those from the stakeholders' workshop activities and strategies (see full MOR€CO II report: Chapter 4), the following recommendations can be formulated for public decision-makers and actors to respond to increasing mobility costs in the Munich region.

For each strategy, the different spatial scales and the main actors responsible are named.

Local level: municipalities

Promoting local areas

Local vulnerability, in the case of mobility cost increases, can be reduced through targeted internal development and sustainable densification. Terms of land-use mixing are important components (e.g., jobs and workplace activities). Local supply – both from home and from the workplace – with everyday goods also play a major role.

This supply can be both pedestrian- and cycle-based so as to also strengthen local mobility in the process. Recreational open spaces and local activities increase the attractiveness of the neighbourhood and support independence from mobility costs. Accordingly, decentralized, small-scale supply structures should be encouraged, rather than economic driven concentration processes (i.e., economies of scale).

Support of citizen engagement, self-supply and mobile supply

In rural municipalities, public participation can, to some extent, maintain a temporary supply. For example, the citizens of Oberbiberg (a suburb to the south of Munich) organize their own citizen bus. As the public transport of the Oberbiberg municipality is inadequate, there are 35 volunteers who drive the bus to the Deisenhofen S-Bahn station. In addition, municipalities can create online forums so as to facilitate car sharing. By carpooling or by increasing car occupancy, mobility costs can be saved.

A similar citizen engagement also applies to village shops that frequently offer and even bundle a range of services - such as post-offices, cafes, pharmacies, etc. Through such arrangements community character is developed through the creation of important social meeting places.

For dispersed locations it is also worthy, for economic reasons, for part of the supply to be maintained temporarily by mobile services (mobile markets, pharmacies, banks, etc).

Regional Level: District and Public Transport Authorities

Inter-municipal cooperation/balance management

In peripheral and vulnerable regions, which cannot alone provide the required supply, inter-municipal cooperation with neighbouring municipalities can be offered. For example, several neighbouring municipalities can operate a common school. If distances are too far for pedestrians or cyclists, an adequate public transport offer (possibly a citizen bus) between these communities can be operated. This will strengthen the regional identity.

Public transport expansion, but only in line with spatial development policy

Especially in a still-growing region, the expansion of public transport is necessary. Such expansion of public transport should only be undertaken in conjunction with sophisticated spatial development. Because of this, information concerning the future development of settlement structures (i.e., the location of not only jobs and supply, but also leisure) and their demands should be integrated. In addition to this, dense nodes can form a polycentric network, so as to enable an efficient public transport system. A sustainable public transport network should not only be linked radially to the regional centres, but also tangentially.

For sustainable development, especially in rural areas, it is necessary to focus on subspaces, clusters and centres of different hierarchies. In particular, workplace nodes should focus on integrated, high-quality public transport inferred from accessible locations. For this purpose, spatial planning instruments should be consistently employed to avoid further errors and oversights. This requires joint responsibility on the municipal level and thus a corresponding reform of business related taxes.

Accessible places

The designation of business areas to greenfields happens often without a prior assessment of traffic impacts. These peripheral and non-integrated sites are not sustainable in relation to rising mobility costs. In the future, public transport accessibility for business areas will also be an important factor (as already seen today with one particular company co-financed bus line in Munich region).

Promotion of a "Sharing economy" → Inter-modality → Establish networks / nodes

Much potential lies in mobility chains (i.e., in linking different modes of transport). A good example of this is bicycle stations, which can be implemented at public transport nodes such as train stations. By doing so, bicycles can be used to travel to the S-Bahn, and then for the remaining distance to the workplace, in order to solve the last mile problem.

Innovative mobility models – such as car-sharing, carpooling – will in future make individual mobility behaviour more flexible.

Promote e-mobility, particularly in rural structured areas

With an increase in mobility costs, electric mobility can also gain attractiveness, if the price of energy (see energy turnaround) does not increase to a similar extent. E-mobility offers opportunities, especially for dispersed rural municipalities, since an efficient public transport system cannot be operated effectively and the distances for non-motorized mobility are too large.

Upper levels: State of Bavaria, Federal, EU

Many of the measures discussed are often only be achieved by a higher-level promotion or provision by the State of Bavaria, the federal government or the EU. Consequently, a sub-regional, cross-sectorial funding policy for the respective measures is needed.

These responsibilities are often not clearly defined. Whose responsibility is the widespread rollout of high-speed Internet access using broadband cabling? If such a service was available, peripheral regions – through e-services such as e-shopping, e-learning, e-banking etc. – can be supplied. However, nationwide broadband coverage is not attractive for the private sector and hardly affordable with public funds.

For additional information see:

Büttner, B., Ji, C., Wulfhorst, G. (2014): MOR€CO II: Handlungsempfehlungen für öffentliche Akteure zur Reaktion auf steigende Mobilitätskosten im MVV-Raum. Munich

Büttner, B.; Wulfhorst, G.; Crozet, Y.; Mercier, A. (2013): The impact of sharp increases in mobility costs analysed by means of the vulnerability assessment. 13th WCTR, Rio de Janeiro

Büttner, B., Wulfhorst, G. (2012): MOR€CO: Untersuchung der künftigen Wohn- und Mobilitätskosten für private Haushalte in der Region München. Munich

Büttner, B., Wulfhorst, G. (2012): MOR€CO: Analysis of future residential and mobility costs for private households in Munich Region. Munich

http://www.sv.bgu.tum.de

http://www.moreco-project.eu

http://www.muenchen.de/rathaus/Stadtverwaltung/Referat-fuer-Stadtplanung-und-Bauordnung/Stadtentwicklung/Regionale-Themen/EU-Projekt-MORECO.html

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