TEXTE
14/2019

Ecological and economic potential of integrated mobility concepts in small and medium sized centers as well as rural areas in light of demographic change

Summary

For our Environment

Umwelt Bundesamt

TEXTE 14/2019

Environmental Research of the
Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

Project No. (FKZ) 3714 16 150 0
Report No. (UBA-FB) 002735

Ecological and economic potential of integrated mobility concepts in small and medium sized centers as well as rural areas in light of demographic change

Summary

by

Dr. Melanie Herget, Frank Hunsicker, Jonas Koch
Innovationszentrum für Mobilität und gesellschaftlichen Wandel, Berlin

Dr. Bastian Chlond, Dr. Clotilde Minster, Dr. Tamer Soylu
Karlsruher Institut für Technologie, Institut für Verkehrswesen, Karlsruhe

On behalf of the German Environment Agency

Imprint

Publisher:
Umweltbundesamt
Wörlitzer Platz 1
06844 Dessau-Roßlau
Tel: +49 340-2103-0
Fax: +49 340-2103-2285
buergerservice@uba.de
Internet: www.umweltbundesamt.de

/umweltbundesamt.de
/umweltbundesamt

Study performed by:
Innovationszentrum für Mobilität und gesellschaftlichen Wandel (InnoZ) GmbH
EUREF-Campus 16
10829 Berlin

Karlsruher Institut für Technologie (KIT)
Institut für Verkehrswesen
Otto Ammann-Platz 9, Gebäude 10.30
76131 Karlsruhe

Study completed in:
October 2018

Edited by:
Section I 2.1 Environment and Transport
Michael Bölke

Publication as pdf:
http://www.umweltbundesamt.de/publikationen

ISSN 1862-4804

Dessau-Roßlau, February 2019

Content

List of Figures

List of Tables

Abbreviation

A-S-I	Avoid – Shift - Improve
BBSR	Federal Institute for Research on Building, Urban Affairs and Spatial Development
BRT	Bus Rapid Transit
CO_2	Carbon Dioxid
DRT	Demand Responsive Transport
ICT	Information and Communication Technology
NVP	Local Transport Plan
ÖPNV	Local Public Transport
PBefG	German Passenger Transport Act
PR	Public Relations
TREMOD	Transport Emission Model (Digital modelling tool of the UBA for the calculation of air pollutants and green house gas emissions of motorised transport in Germany)
UBA	Federal Environmental Agency
WP	Working Package

1 Status quo and project objectives

Rural areas today are facing a variety of challenges (demographic change, less medical services etc.). Currently there are no transport options which will be able to satisfy everyone with their individual mobility demands. This problem will intensify in the future. Therefore, it is necessary to connect the advantages of different means of transportation - motorised and non-motorised - to a greater extent than it is done today. Thereby, alternatives can be offered for everyone, and in order to confront this and similar challenges a decisive course must already be set today. Hence, this calls for the creation of an integrated overall concept.

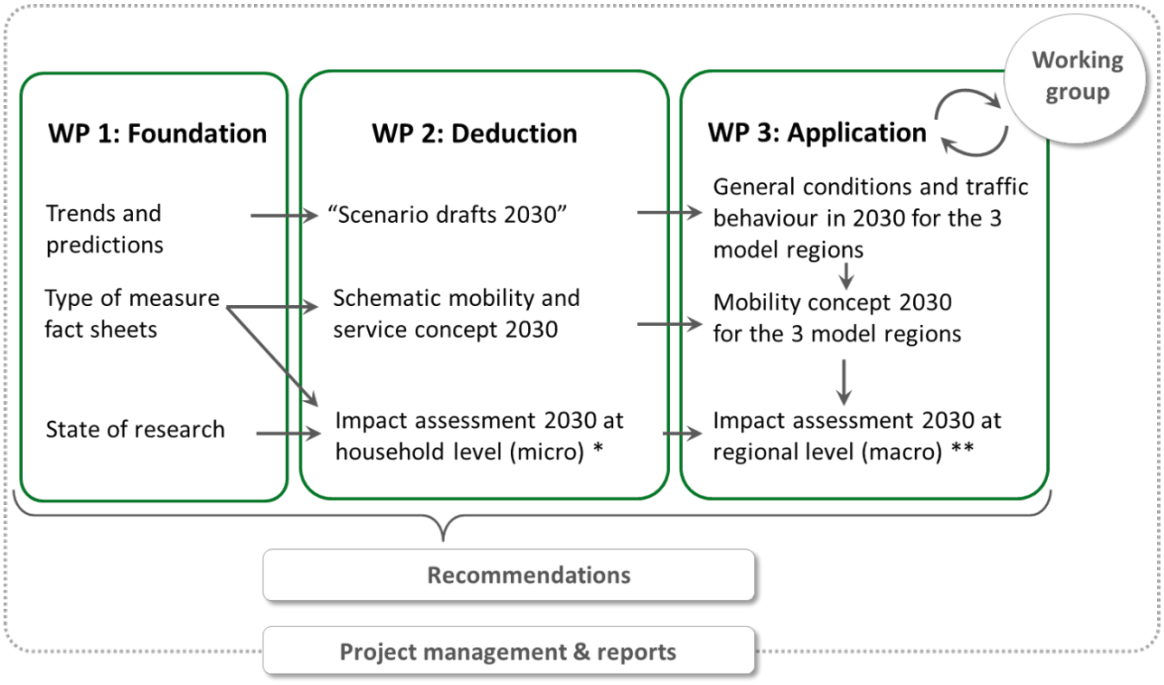
With that said, the project aims to provide assistance and recommendations for politicians, administration officials, transport associations and mobility service providers on how the transport sector in rural areas, small and medium-sized centres can be made less emission-intensive. This incorporates the three strategies: traffic avoidance (A), traffic shift (S) and improving traffic efficiency (I). It was of special interest within the scope of this project to analyse how the A-S-I-approach can be translated into specific actions.

Figure 1 summarizes the results of the project and visualizes the interactions between the different working packages (WP):

Initially, central research and fundamental work was carried out to create a base of knowledge (WP 1). WP1 formed the basis for deriving assessment rules for potential environmental relief (WP 2). The assessment rules were in turn applied to three specific rural model regions in order to design customized integrated mobility concepts on the basis of local conditions, and to (hypothetical) outline consequences in the near future in 2030 (WP 3).

However, an economic assessment of the integrated mobility concepts in the three model regions, in addition to the calculation of the environmental relief potential, was not feasible. This was mainly due to the fact that cost structures of measures introduced for the first time in a region or measures that have only been tested short-term can merely be estimated with great uncertainty due to their experimental character.

Figure 1: Workflow and its interplay (own illustration, InnoZ)



** includes derivations for acceptance and CO_2 emissions for individual measures at the level of the private households*

*** includes derivations/projections on CO_2 emissions for the overall concept as well as individual bundles of measures at the level of the specific data of the three model regions involved*

2 What are integrated mobility concepts?

2.1 Types of measures and guidelines for their use

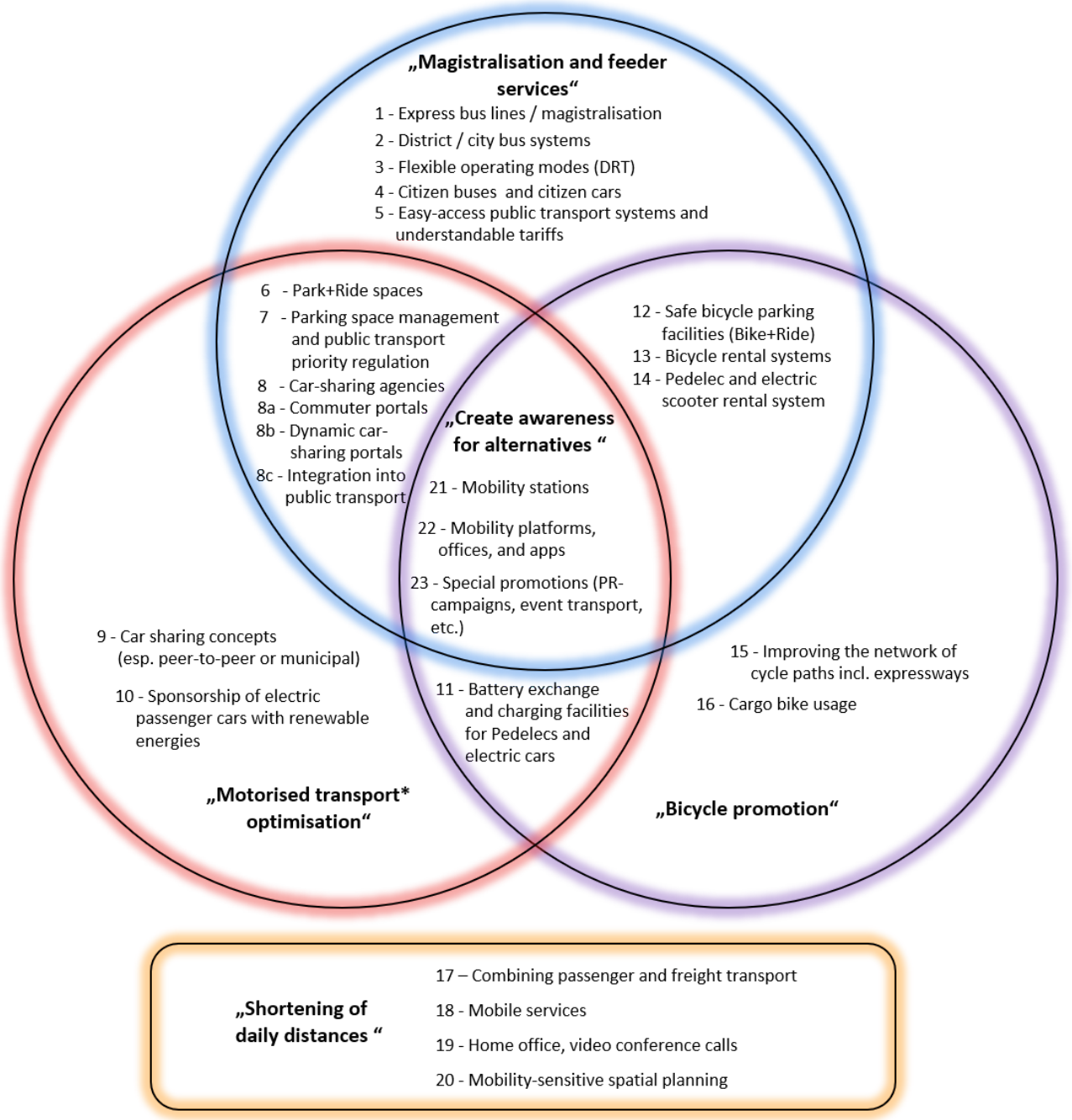
The diversity of suitable approaches for improving mobility in rural areas, small and medium-sized centres has been presented in the form of fact sheets for each measure. The types of measures describe the highly selective individual elements of an integrated mobility concept. The fact sheets of types of measures are available online[1] and can serve municipalities and other decision-makers as a condensed introduction to the topic and as a useful source of inspiration and information. **Figure 2** shows the 23 types of measures prepared as individual fact sheets. These were summarized to the following five superior measure bundles[2]:

- **Magistralisation and feeder services:**
  Measures in this bundle help to make public transport faster and more responsive. This includes in particular the introduction of BRT / express bus lines on main transport axes (1). Few stops and clear origin-destination relations shorten travel times. In addition, feeders ensure access from the area, e.g. through district/city bus systems (2), flexible operating modes (DRT) (3) or "Bürgerbusse" (citizen buses) (4). Easy-access public transport systems and understandable tariffs (5) make it easier for inexperienced people to use the services.
- **Motorised transport optimisation:** Measures in this bundle aim to optimise motorised individual transport, in particular private car use. This includes, for example, the introduction or modernisation of Park+Ride spaces (6) and parking space management (7). In addition, car journeys can be combined stronger through car-sharing agencies (8), commuter portals (8a) and dynamic car-sharing portals (8b). Car sharing concepts can help to reduce the number of cars owned by individuals (9). Electric passenger cars with renewable energies (10) help to reduce emissions per driven distance, assumed that sufficient battery exchange and charging facilities have been created for electric vehicles (11). Measure types 6-8b can be assigned to both the "Motorised transport optimisation" bundle and the "Magistralisation and feeder services" bundle.
- **Bicycle promotion:** Measures in this bundle strengthen the bicycle, either as a main means of transport by improving the network of cycle paths and establishing express cycle routes (15), or as a feeder to and from public transport through safe bicycle parking facilities (12) and rental systems (13, 14, 16). Measure types 12-14 can be assigned to both the " Motorised transport optimisation" bundle and the "Bicycle promotion" bundle.
- **Shortening of daily distances:** Measures in this bundle aim to avoid traffic. The combination of passenger and freight transport (17) can improve the emission-efficiency and cost balance of public transport. Home office (19) avoids and reduces distances between home and work. Mobile services (18), at least temporarily, enable a supply close to home with short distances. Mobility-sensitive spatial planning (20) can ultimately help to shorten or avoid distances in the long term.
- **Create awareness for alternatives:** Measures in this bundle increase the visibility of alternatives to private car use. At mobility stations (21), various mobility offers are available centrally and make it quick and easy to interchange between them. Mobility platforms, information offices, and apps (22) simplify the information and booking of mobility-related offers. Special promotions (such as PR-campaigns, transport to and from events, etc.) (23) can also awake the interest of non-users and encourage them to try out alternatives.

[1] http://mobilpotenziale.innoz.de/links-downloads.html (Last: 13.07.2018)

[2] In brackets: number of each types of measure

Figure 2: Types of measures and bundles - overview (own illustration, InnoZ)



* Motorised individual traffic (= using private cars, scooters, motorbikes etc.)

2.2 Mobility concepts for the three model regions

In a first step, the transport demand relation and transport-relevant structures were analysed for the three model regions as a basis to develop suitable mobility concepts. These mobility concepts also serve as a foundation for later impact assessments. Time wise, the concepts are looking at the year 2030. The three mobility concepts represent adequate and viable bundles of measures to improve mobility and accessibility in the regions. This is done by combining the individual measures, each presented in a fact sheet. The focus explicitly lies on the daily commutes of those people who live in the model regions. Therefore, the parameters "goods", "long-distance", and "holiday traffic" are excluded. The concept does not represent a detailed planning document, but instead should be applied as potential rough concept for everyday traffic. The mobility concepts were developed jointly with the relative model region. School transport services were not a part of the conceptions but stayed untouched as a main premise in all three model regions.

Figure 3 (bottom) and Figure 4 (next page) show the procedure for the preparation of the mobility concepts. This procedure is explained in more detail, using the mobility concept for Kulmbach model region in northern Bavaria. The mobility concepts for all three model regions are described in detail in the main version of the final report (only available in German).

Figure 3: Procedure for the development of integrated mobility concepts (own illustration, InnoZ)

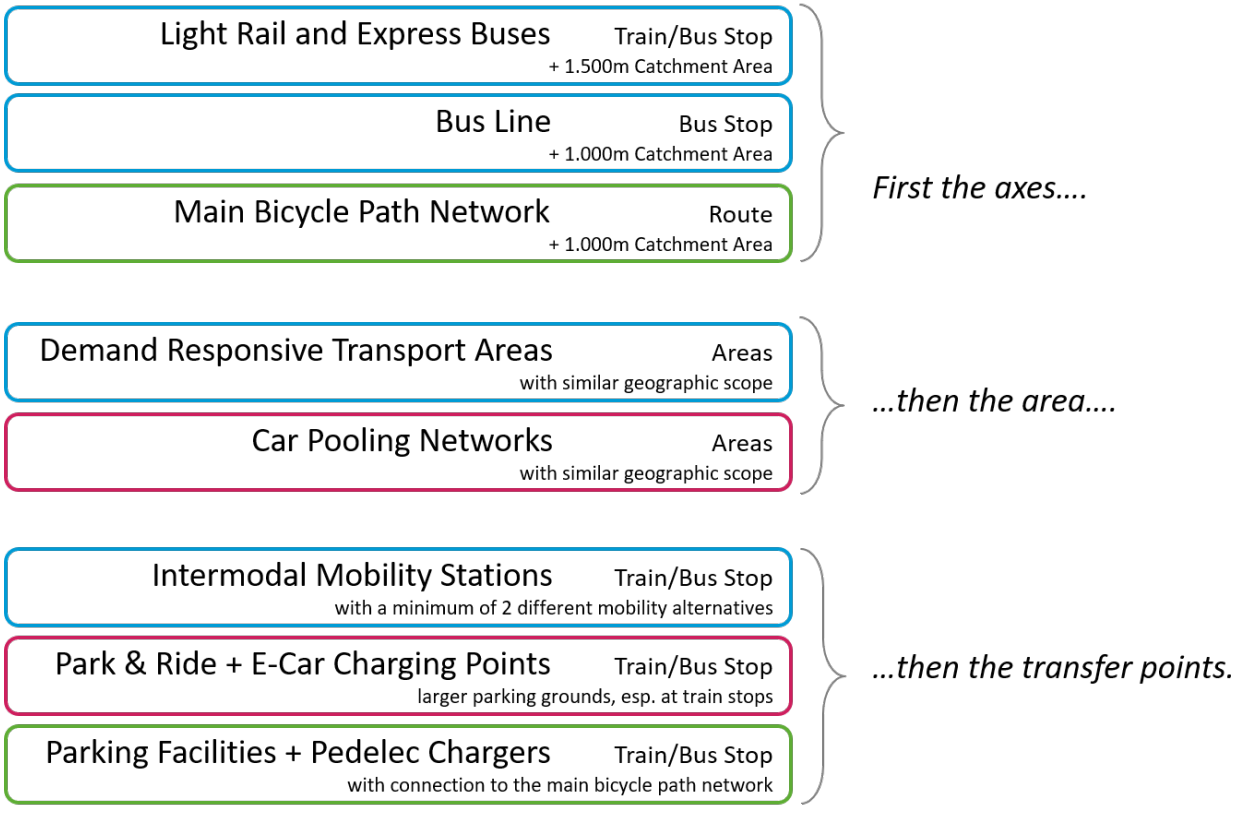


Figure 4: Flowchart for integrated mobility concepts (own illustration, InnoZ)

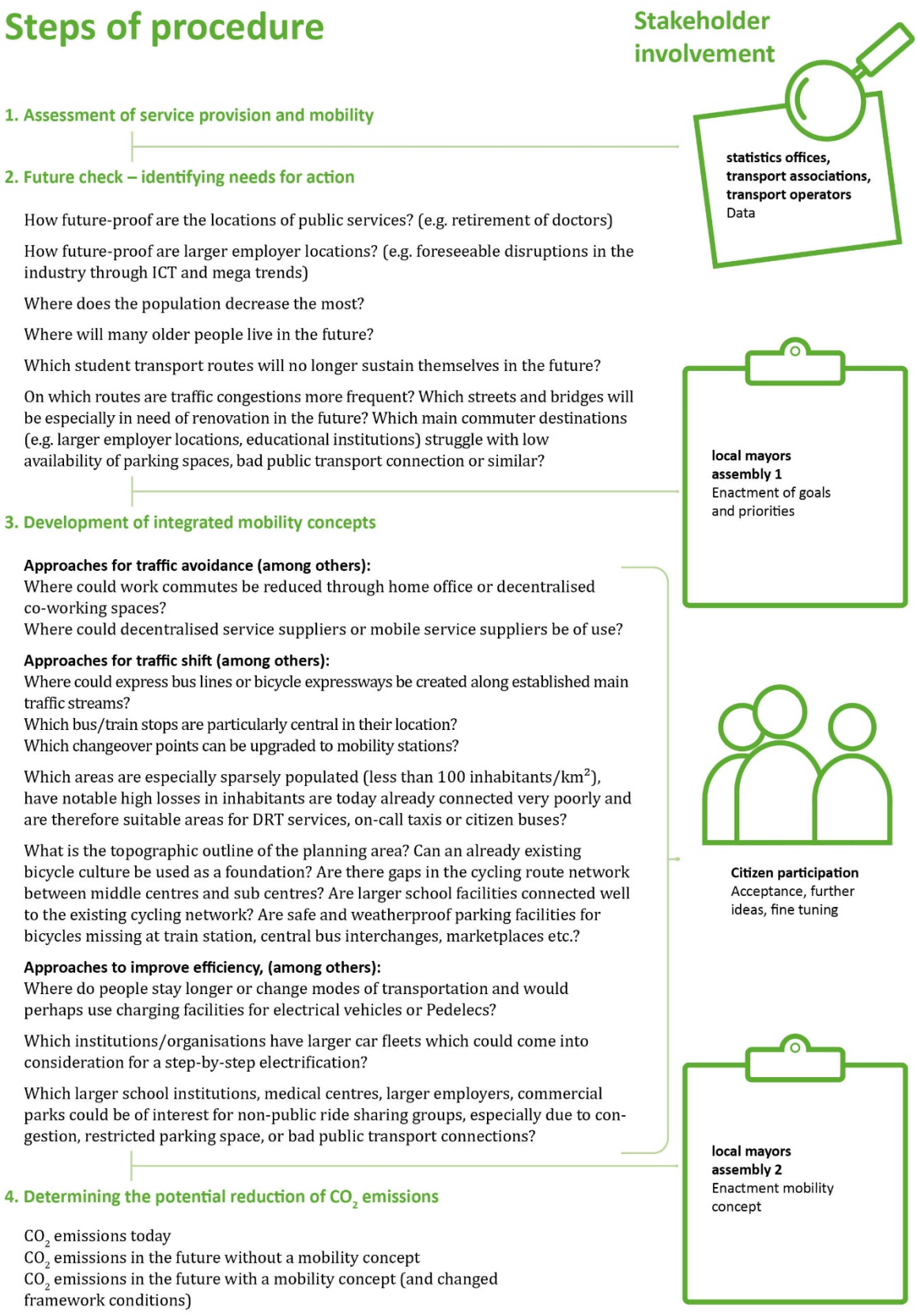
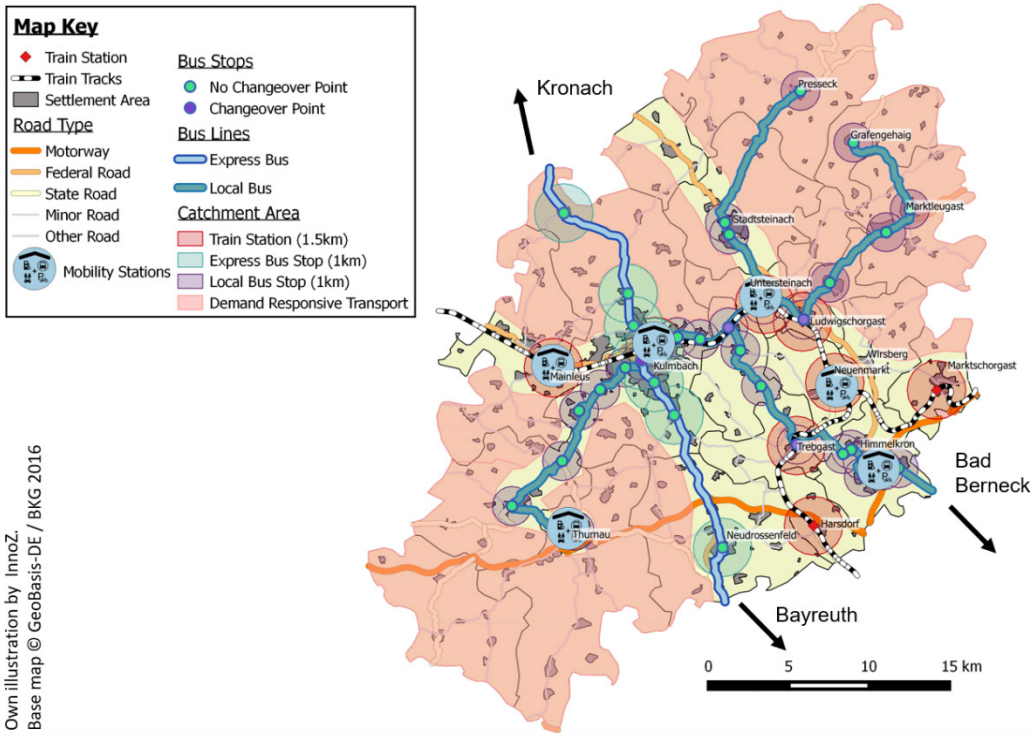


Figure 5 shows the sub-concept for public transport and mobility stations for the Kulmbach model region. The central goal in the administrative district Kulmbach was to improve the connection between the south-western and north-eastern regions and their respective connection with the city of Kulmbach and the local light rail services. In the model regions of Pirmasens/Südwestpfalz and Nordwestmecklenburg the same conceptual steps were carried out. Due to the regional peculiarities, there are some differences between the three mobility concepts:

- The current local light rail service (SPNV) was used as the backbone of the mobility concept. An additional express bus line from Kronach in the north via Kulmbach to Bayreuth in the south could provide a better connection to the nearest centres of supra-regional importance. In addition, this would enable a rapid changeover to the regional rail service in those cities. The supplementary local bus lines will provide a better connection of the settlement areas with the main supply centres and railway stations.
- In the areas between the axes, in particular in the sparsely populated regions, flexible operating modes (DRT) are introduced in order to provide basic transport connection as part of the required public service provision.
- Six mobility stations form the core of the mobility concept. At the most important interconnection points, they are intended to offer an easy changeover between the feeder lines from the area and the fast services on the axes. The synchronisation of the offers and the shortest possible changeover times are imperative. Mobility stations can also integrate local supply and service offers, serve as meeting points for car-sharing and provide safe parking and charging infrastructure in particular for electric cars and Pedelecs.
- In the administrative district of Kulmbach, the promotion of bicycle traffic is an important corner stone. Mainly, because a certain "bicycle affinity" can be identified. Especially in the urban centre of Kulmbach, the bicycle infrastructure should therefore be significantly expanded. In the northeast, on the other hand, the topographical conditions limit the expansion of the bicycle infrastructure significantly.

Figure 5: Mobility concept Kulmbach: Sub-concept for public transport and mobility stations



3 Procedure for determining the potential for environmental relief

The developed method for the determination of environmental relief potentials represents the basis for the impact assessment of innovative mobility concepts for the year 2030. At the level of individual mobility (micro level), rules and probabilities for the use and acceptance of services and bundles of measures were derived for defined user groups and travel purposes. On this basis, changes in behaviour and the resulting environmental impacts can be determined in the form of rules. The rules and their probabilities of occurrence were determined on the level of individual exits.

The exit is the chain of paths of a person who begins at home, then visits one or more destinations for different purposes. The path finally ends at home.

In individual cases, the acceptance probabilities for specific bundles of measures were further differentiated for the respective model regions. This became necessary as, for example, the three model regions have a quite different bicycle culture, which in turn means that the effects of one and the same bicycle promotion measure differ considerably. The effects of the bundles of measures formulated as rules are based on the experiences in other projects, in case studies and on the state of the current research. A total of five interacting bundles of measures, plus the promotion of electric vehicles, were considered to determine the potential for environmental relief:

- **Traffic avoidance:** Mobility-sensitive spatial planning, home office and mobile services can shorten individual itineraries or even eliminate them altogether.
- **Public transport magistralisation:** Express bus lines / BRT help the population in small communities and rural areas to reach medium-sized centres - as important locations of employment, educational and administrative centres - within a reasonable time even without using a private car. In addition, express bus lines / BRT can offer an alternative to private cars if, for example, the express bus axes run along large commuter routes.
- **Basic public transport operation incl. integration of ride sharing offers:** Demand responsive transport (DRT) offers (e.g. on-call taxi, on-call bus), citizen buses and vans, public transport integrated car-sharing offers, easy public transport access systems and tariffs accompanied by PR-measures and special promotions (campaigns, transport to and from events etc.) ensure an important basic transport service as a complete package. This is especially important for people without a driving licence or access to a car.
- **Carpooling (for commuters):** Both recurring carpooling (especially for commuters) and short-term carpooling and ride sharing opportunities for occasional trips should be encouraged - these have different effects on the ecological footprint.
- **Bicycle promotion:** Improved networks of cycling paths, safe bicycle parking facilities and integration of bicycle infrastructure in mobility stations promote bicycle traffic in both, urban and rural areas. For urban areas, further support measures include (car-)parking space management, bike and cargo bike rental systems, as well as battery exchange and charging facilities for Pedelecs.
- **Promotion of electric vehicles:** Mobility with conventional cars is replaced by mobility with electric vehicles (for suitable distances) for households with high interest in purchasing an electric vehicle.

In our estimates, car sharing has no effect on CO_2 emissions, since the CO_2 emission values derived from TREMOD are basically the same during the use phase, regardless of whether the vehicle is used privately or shared.

4 Potential for environmental relief until 2030

During this project, environmental relief potentials were only considered in terms of CO_2 emission savings during the use phase. An overall eco-balance, which also considers the ecological consequences of production and disposal, was not dealt with within the framework of the project. The CO_2 savings initially result from the consequences of demographic change (decreasing number of people, especially in the observed rural regions) and a decreasing per capita traffic volume (= traffic avoidance potentials). In addition, changes in behaviour towards the use of more efficient and low-emission means of transport reduce CO_2 emissions (= potential for modal shift).

Since specific information on transport behaviour was not available for the individual model regions, the data on mobility behaviour of the German population from the German Mobility Panel (2008-2013) was used to adequately map transport behaviour and transport-related CO_2 emissions in the model regions. This approach is based on the premise that traffic behaviour in areas with similar spatial structures is comparable. Thus, the traffic behaviour surveyed nationwide can be transferred to the respective model region. For this purpose, the population composition is weighted according to community types and age structure. This step is performed both for the starting year 2010 (as a baseline) and for the year 2030, on the basis of the population structure projections. Following this approach, a quantitative estimation of mobility behaviour and the associated CO_2 emissions can be determined for each region for 2010 and 2030.

The results of the assessment of potential CO_2 savings per bundle of measures and region can be found in **Table 1**. The greatest potential for CO_2 savings is offered by the shift from conventional cars to electric cars. Assuming that a sufficient number of charging stations will be available by 2030 and that the purchase price can be significantly reduced compared to that of a combustion vehicle (= positive scenario), this measure will affect almost all groups of people and trip purposes. As a result, approximately 11% to 14% of CO_2 emissions can be saved in the model regions. The measure of increased home office, on the other hand, only affects the commuting distances of employees. Potential CO_2 savings here amount to approx. 0.7 %. Although the concept of bicycle promotion, which comprises various measures, affects all groups of people, the CO_2 saving effect is relatively small and lies between 0.2 % and 1.9 %, varying strongly between the model regions as for their different topography and "bicycle culture". The low CO_2 saving potential can mainly be attributed to the fact that distances travelled on bicycles are significantly lower. The new conception and establishment of express bus lines / BRT results in savings of 0.1 % to 0.6 %. Commuter portals and spontaneous ride sharing in commuter traffic result in CO_2 savings of approx. 2 %. By contrast, replacing a bus ride with ride sharing and thereby substituting public transport services (i.e. replacing a small bus/van or DRT vehicle with a shared car ride) is unlikely to lead to any savings. The main reason for this is, that the only sporadic transport of individual persons in the one direction results in more empty public transport vehicles in the opposite direction, thus increases the overall volume of traffic. However, from a purely financial point of view, these offers can be presented more cost-effectively.

Due to demographic change and technical progress alone, it can be assumed that by 2030 CO_2 emissions will have been cut by around 40 % (compared with our reference year 2010) without any additional measures being introduced. In the positive scenario of 2030 with the introduction of the bundles of measures, this amount increases to around 50 % less CO_2 emissions compared with the initial situation in 2010. This means that the impact contribution of the bundles of measures is in itself around 10 %. Possible cannibalisation effects between the means of transport which have a lower environmental impact were not considered, as there are no reliable empirical values available. However, if very different bundles of measures are implemented at the same time, those kinds of effects can never be completely excluded. The same, however, also applies to additional traffic offers and synergy effects that lead to a strengthening of the effects of individual measures.

Table 1: Factors influencing CO_2 emissions in the three model regions (own illustration, KIT)

	Kulmbach district	**Pirmasens/ Südwestpfalz district**	**Nordwestmecklen-burg district**
Baseline 2010 - reference point (1)			
Population (> 10 yrs.)	70,250	129,276	143,522
Car ownership[3]	610-640	512-630	432-480
kg CO_2 / Person / Day	6.8	6.3	5.7
CO_2 emissions/ Week	3,360 t	5,702 t	5,698 t
Prediction for 2030 as a trend scenario (2)			
Demographic development	-11.2 %	-12.0 %	-5.1 %
Car ownership [3]	630-661	579-665	454-528
kg CO_2 / Person / Day	4.4	4.1	3.7
CO_2 emissions/ Week	1,927 t	3,298 t	3,570 t
Impact of the bundles of measures within the positive scenario 2030 (3) (Alteration of CO_2 emissions per week compared to the trend scenario 2030)			
… Home office	- 13.5 t (- 0.7 %)	- 22.3 t (- 0.7 %)	- 24.4 t (- 0.7 %)
… Electric vehicles	- 259.3 t (- 13.4 %)	- 457.4 t (- 13.7 %)	- 387.9 t (- 10.9 %)
… Bicycles and Pedelecs	- 18.8 t (- 1.0 %)	- 7.7 t (- 0.2 %)	- 69.1 t (- 1.9 %)
… BRT	- 12.4 t (- 0.6 %)	- 4.9 t (- 0.1 %)	- 17.8 t (- 0.5 %)
… Commuter portals	- 39 t (- 2.1 %)	- 63.6 t (- 1.9 %)	- 66.1 t (- 1.8 %)
… Carpooling replacing public transport	+ 0.3 t (+0.02 %)	+ 0.3 t (+ 0.01 %)	+ 1.1 t (+ 0.03 %)
… Mobile Services	-	-	- 0.21 t (- 0 %)
Total sum of CO_2 reductions/ week 2030 (with measures (3)) compared to the trend scenario (2)	- 342 t (- 17.8 %)	- 555.6 t (- 16.8 %)	- 564.4 t (- 15.8 %)
Balance 2010-2030			
CO_2 reductions/ week within the trend scenario 2030 (without measures, (2)) compared to the baseline in 2010 (1)	- 1,433 t (- 42.6 %)	- 2,404 t (- 42.2 %)	- 2,128 t (- 37.3 %)
Total sum of CO_2 reductions/ week within the positive scenario 2030 (trend scenario (2) plus measures (3)) compared to (1))	- 1,776 t (- 52.8 %)	- 2,960 t (- 51.9 %)	- 2,692 t (- 47.3 %)

[3] The variation of car ownership numbers [Cars/1,000 People] is a result of the differences between medium-sized centres (lower numbers) and rural municipalities (higher numbers)

5 Recommendations and conclusion

Within the scope of this research project first results could be generated on the extent to which integrated mobility concepts in small and medium-sized cities and rural areas can contribute to the reduction of CO_2 emissions. It has to be acknowledged, that the three model regions vary widely amongst each other and within themselves due to their specific regional and local characteristics. Since the investigated areas are very diverse in their spatial making, the conducted research did not follow a general approach which was designed for the entire region but instead was adjusted to specific situations. It is vital to find a good balance between the aspiration for ecological sustainability and the community needs in terms of provided public services. This is an especially demanding task in rural areas where long commutes to (public) service locations are common. When assessing the ecological impacts, it should also be kept in mind that not only CO_2 emissions (on which this project was focused on) are of relevance. It is crucial, that all aspects such as production and disposal costs, noise pollution and land use have to be incorporated in a holistic approach.

Sustainable decision bases are essential for the planning of transport services that match the real traffic linkages and requirements. For this purpose, much more reliable and uniform data bases are needed, especially on those real traffic patterns. In order to have municipal data (e.g. supply locations, traffic links) uniformly available nationwide, federal institutions such as the BBSR should coordinate and ensure the quality of data collection, in close coordination with the statistical offices on the federal state level. Geoportals at district and/or federal state level are a useful instrument for the uniform provision of georeferenced data. In order to help municipalities to set up such geoportals, the federal government and the federal states should provide appropriate support through funding programmes.

We recommend a **comprehensive reform of public transport financing** for the "Magistralisation and feeder services" bundle of measures. In rural areas, local public transport is now largely financed by compensation payments for school transports in accordance with § 45a of the German Passenger Transport Act (PBefG) or the corresponding Public Transport Act in the Federal States (Landes-ÖPNV-Gesetze). The amount of these compensation payments only depends on the number of students transported and leads to bus routes that are of little convenience for everyday journeys for non-students. In the medium term, the public transport offer in rural areas will thus be endangered due to foreseeable underfunding throughout Germany. In order to guarantee more solid public transport financing, new funding models urgently need to be developed. These should also consider and integrate elements of beneficiary financing. In addition, the federal states should, more than in the past, **perceive public transport lines of federal importance as a central task** in order to ensure cross-country connections between important centres and railway stations beyond the existing light rail services.

The public transport authorities are obliged to consider the needs of people with reduced mobility or sensory impairments in their local transport plans (NVP) - however, the conversion to accessible infrastructures for the handicapped represents a major financial hurdle for the municipalities and public transport authorities. We therefore recommend that modular and **flexible approaches to improve accessibility** must be promoted more vigorously. This also applies to mobility stations as central changeover stops.

In many cases the establishment of DRT-services is connected with substantial efforts for many operators and citizens' initiatives. For this reason, we recommend nationwide funding programmes and suitable **regional competence centres** for qualification and advice.

In rural areas, private cars are currently the most frequently used means of transport for everyday journeys. With regard to the occupancy rate and the type of drive, however, there is still potential for ecological optimisation. Therefore, a recommendation is to **promote more efficient and environmentally friendly passenger cars**. The introduction of a motor vehicle tax that is dependent on environmental pollution would, for example, be an incentive to purchase environmentally friendly cars.

Financial incentives to buy low-emission passenger cars are also conceivable as a longer-term support programme. The public sector should also serve as a role model and shift its own fleets to vehicles with the lowest possible emissions. To this end, there are already formulated targets for conventionally and electrically powered car fleets in the Sustainability Programme of the Federal Administration.[4]

The high number of second and third cars in rural areas and the high availability of private garages as parking spaces in particular offer great potential for electric vehicles. For the widespread use of electric vehicles, however, a denser and more reliable charging infrastructure than the current one is needed. More intensive **promotion and advisory programmes for decentralised renewable energy generation** on garage roofs, barns, etc. would proof helpful too.

The **establishment or revival of a carpooling culture** in rural areas also contributes to the optimisation of car traffic. With the help of app-based car-sharing agencies and commuter portals at a district or federal state level it would be possible to find suitable car pools, especially for regular and well-planned commutes, which would increase the occupancy rate and thus the efficiency of the private motorised transport.

Ride selling (= ride sharing with the intention of gaining a profit) could also optimise the private motorised transport and provide additional travel services as a substitute for public transport. This could at least reduce the need for public transport subsidies in certain areas and in times of low demand. A general promotion of ride selling offers is not to be recommended. However, because of possible cannibalisation effects to be expected which could lead to lower demand of public transport services: Ride selling is therefore not permitted in Germany under the currently applicable PBefG. This is even the case, if no taxi companies or scheduled public transport services are operating in that region that could lose customers as a result of ride sharing services. Under appropriate framework conditions, a reform of the PBefG should explicitly permit the **testing of new business models in accordance with the experimentation clause** of the PBefG. The framework condition would need to be defined as specific as possible. In the long term this approach could lead to the creation of a legal framework in which it would be possible to offer (spontaneous) rides to passengers as a supplementary mobility service to public transport, especially in rural areas.

In rural areas the distances are usually greater than in the city. This significantly increases the travel time advantage of the private motorised transport compared to the use of a bicycle. Bicycle promotion should therefore not only focus on inner city routes, but in particular improve its function as a feeder service to public transport. This is crucial in order to shift longer distances to more environmentally friendly means of transportation. Hence, the **expansion of bicycle parking facilities** at central changeover points is an important pillar. **Bicycle expressways** can also be a promising measure to make the use of bicycles and Pedelecs more attractive for longer journeys.

After all, transport infrastructures are often very car-oriented. This is reflected, for example, in the dimensioning of roads and car parks in medium-sized cities. As a result, the use of cars is more attractive compared to other means of transport. In order to achieve the shift to more environmentally friendly means of transportation, funding could be explicitly put out to tender for appropriate, well-considered deconstruction of car infrastructure in medium-sized cities. The space available in turn can be used for a suitable **redistribution of public space toward public transport services**, which are in line with the actual use patterns of available transport services. PR-campaigns and communication as part of the

[4] https://www.bundesregierung.de/Content/DE/_Anlagen/2015/03/2015-03-30-massnahmenprogramm-nachhaltigkeit.pdf?__blob=publicationFile&v=3 (Last accessed 18.09.2018)

mobility management should accompany and support infrastructure measures - after all, mobility begins with the mind!