PTV Group

BICYCLE playbook

Cycling protects the climate, creates liveable cities and keeps society healthy at the same time. **Absolutely worth supporting!** This bicycle playbook shows you why cycling is relevant for your infrastructure planning. Get to know the different concepts that you can put into practice in your city or community.


Cycling is
more than
a trend

For our bicycle playbook, the following **experts have shared their knowledge** about cycling with us.

Klaus Bondam is a politician and Director of the Danish Cyclist Federation. He advocates more road safety, accessibility and comfort when cycling. From 2006 to 2009, he was Mayor for the Technical and Environmental Administration in Copenhagen and member of the Financial Committee.

Dr. Angela Francke is Endowed Professor for Cycling at the University of Kassel. She researches, for example, year-round cycling.

Christine Fuchs is Director of the Association for Pedestrian and Bicycle-friendly Cities, Townships and Districts in North Rhine-Westphalia e.V., in short AGFS. Here, she advocates more local mobility in North Rhine-Westphalia.

Julie Anne Genter is politician, member of the House of Representatives and former Minister of Transport in New Zealand. During the pandemic she got the promotion of pop-up bike lanes off the ground.

Marion Tiemann advocates the transformation of transportation as Greenpeace climate campaigner. She demands that cities have to be designed for people and not for cars.

Prof. Dr.-Ing. Johannes Schlaich lectures in the Faculty of Mobility and Transport at the Berlin Technology University of Applied Sciences. He deals with the analysis and optimization of urban mobility and how future concepts and technologies affect the travel behavior.

Stephanie Krone is spokesperson of the General German Bicycle Club (ADFC). She advocates a bicycle-friendly Germany which has nationwide cycle paths at the ready.

Lisa-Marie Schaefer works as research associate at the Dresden University of Technology in the field of traffic and transportation psychology. She researches on the topic of cycling as well as on the social influence on mode choice.

Verena Zeidler is project engineer at PTV Transport Consult GmbH. She was part of the group of authors who wrote the National Cycling Plan 3.0 launched by the German government. She supervises planning projects on the cycling infrastructure as project engineer.

If winners were to be selected in the crisis, **the bicycle would have to be given a medal**.

Because during the pandemic, significantly more people got on their bikes than before – in order to maintain their fitness, to substitute other leisure activities, for the benefit of the environment or as an alternative to local transit. A majority wants to maintain this changed mobility behavior. In this sense, the pandemic has strengthened a trend which experts have already been observing for several years: People are increasingly discovering the bicycle for themselves as an active form of mobility in everyday life. This is also reflected in the sales figures.

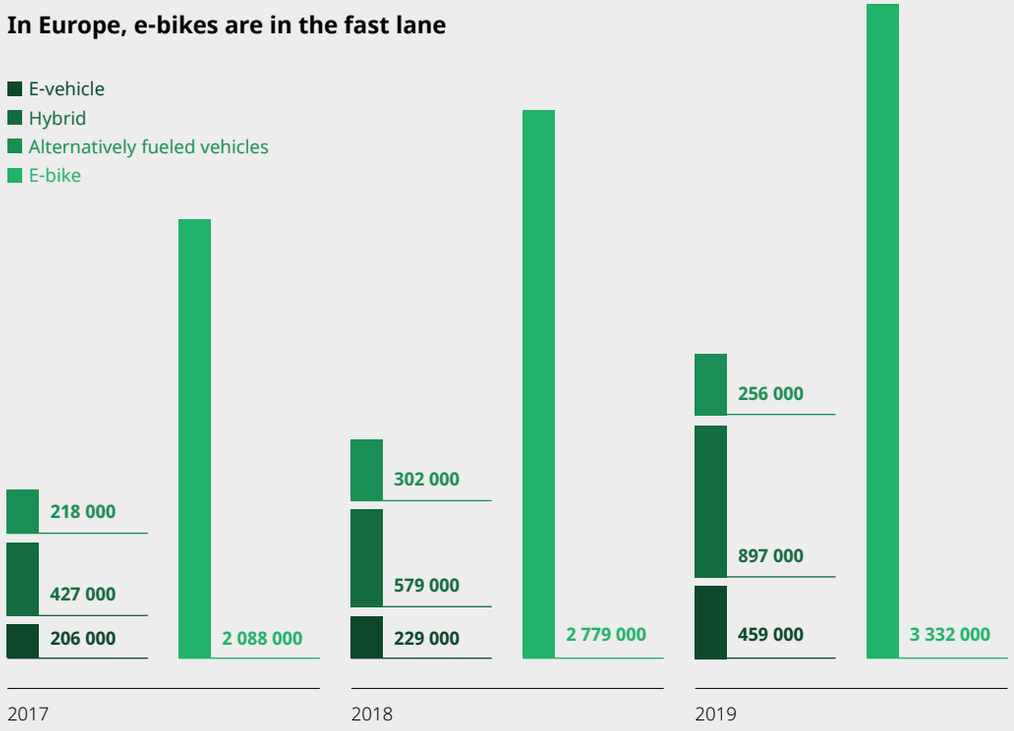
The bicycle market continues to accelerate

Around 20 million bicycles are sold in Europe every year. At the same time, e-bikes in particular are growing in popularity: Even in 2019, every sixth bicycle bought was a pedelec. Experts expect that the market will continue to grow, from 3.4 million electric bicycles sold in 2019 to 13.5 million in 2030.

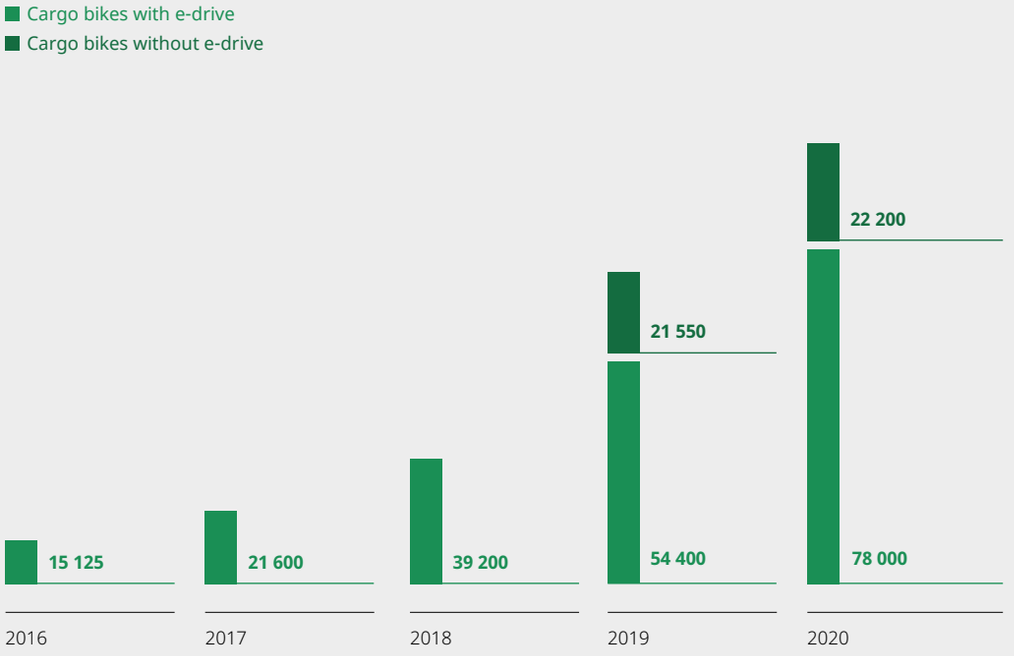
And the market for electrically driven cargo bicycles is also booming: In the year 2020, the global market for e-cargo bikes achieved a value of 550 million US dollars and according to forecasts, will continue to grow by twelve per cent every year. It is expected to top the 1 billion mark for the first time in 2026. Europe dominates the demand: In particular in Germany, Denmark, the Netherlands and in the United Kingdom, people are purchasing the electrically driven cargo bicycles in order to take their shopping home or to ride their children around.

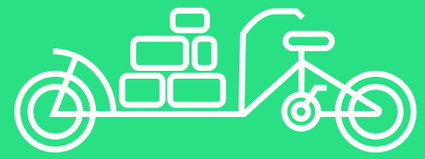
In 2018, more electrically driven cargo bikes were bought in Germany than electric cars.

In Europe, e-bikes are in the fast lane



Cargo bikes sales in Germany





A study on the private use of cargo bikes in the USA has shown: **Owners of electrically driven cargo bicycles reduced their vehicle trips by**

41%

While politics and society are discussing climate protection, the transformation of transportation has already arrived on two wheels. People are getting equipped, they want to cycle more – and are being slowed down because a suitable transportation infrastructure is missing in many places.

“It needs more space, more money, more rights,” demands Marion Tiemann, who is advocating the transformation of transportation as climate campaigner at Greenpeace. “Just putting a bit of paint on the roads somewhere isn’t enough. We need safe bicycle paths on which we can let our children ride without having to worry. Bicycle paths which aren’t blocked by wrongly parked cars and on which cargo bicycles can also safely overtake.”

Cities and communities are required to create a suitable infrastructure. It’s a fact: If you use children as a benchmark for infrastructure planning, you will also reach other target groups. Target groups such as older people and less confident cyclists.

About a perceived safety

Anyone who gets on their bicycle is more vulnerable than motorized road users: While the bodywork of a car serves as protective capsule in a collision, cyclists might only be wearing a helmet. “However, a helmet doesn’t help much when a truck turns right and doesn’t see cyclists. It is a fact that cyclists are the weaker road users,” says Lisa-Marie Schaefer, who carries out studies as research associate at the Dresden University of Technology in the field of transportation psychology. And so cyclists often feel like they are quite at the mercy of road traffic, in particular in places where they are brought together with motorized traffic. This subjective safety varies from person to person and also indicates a gender effect. Various studies show that women generally feel a greater need for safety than men. “This is also reflected in road traffic,” says Lisa-Marie Schaefer. “We see that women have a subjective feeling of being unsafe here more frequently than men do.”

Speed plays a role, among other things, in the perceived risk: “If I am traveling at 20 km/h myself and a car overtakes at 30 km/h, then the difference isn’t that great anymore and straight away I feel more comfortable on the bicycle,” explains the traffic and transportation psychologist. “Also, because I know that in the case of an accident, the severity of an injury is less than when the car is traveling at 50 km/h.” The same is true for a mix of bicycling and walking in which the pedestrian represents the weaker road user.

In addition to the measurable risk, earlier experiences which have been made play a role in the feeling of safety: While accidents with cyclists are documented, near miss accidents do not find a way into the statistics. “In particular when cycling, there is an incredibly high number of critical situations which cyclists report on in our field studies: ‘If I hadn’t been on my guard at that very moment, if I hadn’t braked or jumped off my bike, then there would have been an accident’”, says Lisa-Marie Schaefer.

But what is it that moves people to cycling?

Traffic psychologist Lisa-Marie Schaefer from the Technical University of Dresden has developed a typology of cyclists and asked people about their motivation, preferences and safety needs.

The passionate type

40%

feels confident on two wheels: These cyclists use their bikes a lot – for example to commute to and from work. To get from A to B quickly, they like to ride on proper surfaces. They are not bothered by the traffic around them. However, they do feel more comfortable with a solid line separating them from motorized traffic than with a dashed line.

The pragmatic type

22%

is motivated by the actions of others: These cyclists pedal because the people in their environment do. To them, bicycles are a mode with a positive impact and they mostly travel by bike. Even so, they are quick to feel uncomfortable and unsafe in mixed traffic.

The functional type

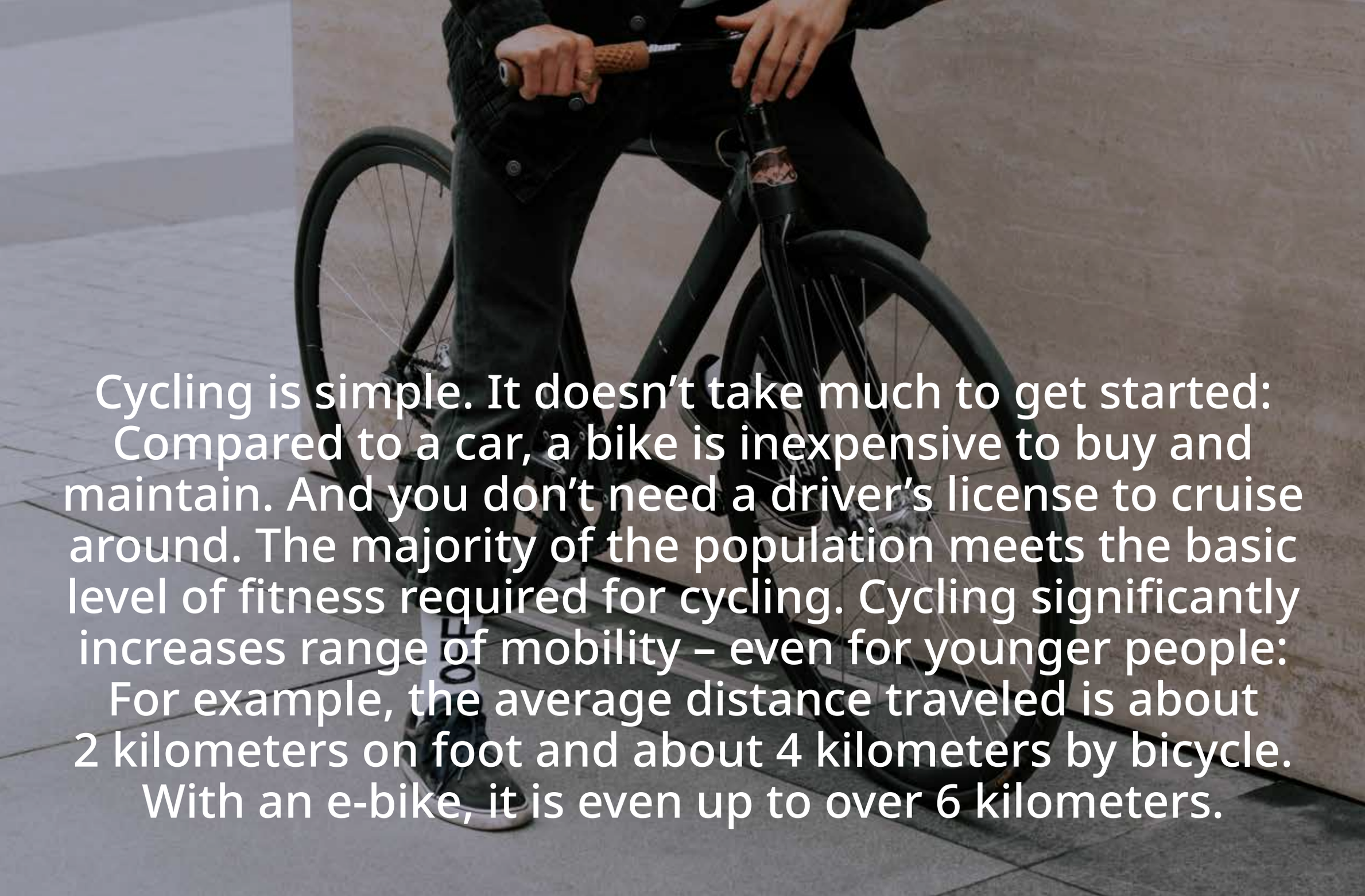
24%

is a fair weather rider: For these cyclists, the exercise aspect is part of the fun and they like to get on their bikes at the weekends or when on vacation. For a beautiful scenery, they will gladly take a detour. To them cycling has to be relaxing. That’s why they love routes with few cars and traffic lights. The more separate their lane is from the other traffic, the safer they feel.

The ambitious type

15%

cherishes time on the bike. These cyclists love a sporting challenge. They scope out long distance routes and enjoy the exercise. Their subjective feeling of safety is similar to that of the passionate type, but is not quite as strong in all traffic situations.



Cycling is simple. It doesn’t take much to get started: Compared to a car, a bike is inexpensive to buy and maintain. And you don’t need a driver’s license to cruise around. The majority of the population meets the basic level of fitness required for cycling. Cycling significantly increases range of mobility – even for younger people: For example, the average distance traveled is about 2 kilometers on foot and about 4 kilometers by bicycle. With an e-bike, it is even up to over 6 kilometers.

“While we’re somewhat isolated when driving, often wear headphones when walking, or are immersed in our phones when using public transportation, when we’re on our bikes, cycling has our undivided attention,” explains traffic psychologist Lisa-Marie Schaefer.

“We’re fully engaged in what’s happening around us and moving at a speed that allows us to actively take in our surroundings.” And despite the risks cyclists may encounter in various traffic situations, bicycles are one of the few travel modes that actually deliver added value:

“Every kilometer by car costs society eleven cents, every kilometer by bicycle yields society 18 cents,” Greenpeace campaigner Marion Tiemann summarizes.

The Handbook of External Transport Costs even lists an average cost of twelve cents per kilometer for traveling by car in Europe.

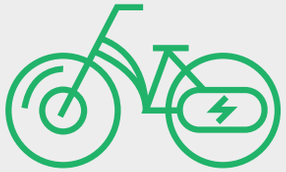
And yet: Although society would be better off if more trips were made by bike, it is car traffic that it is associated with prosperity. “We need more honesty about the true costs of car usage. And it’s the true costs that political decision-making needs to take into account,” says Marion Tiemann.

Extending the radius

2 km

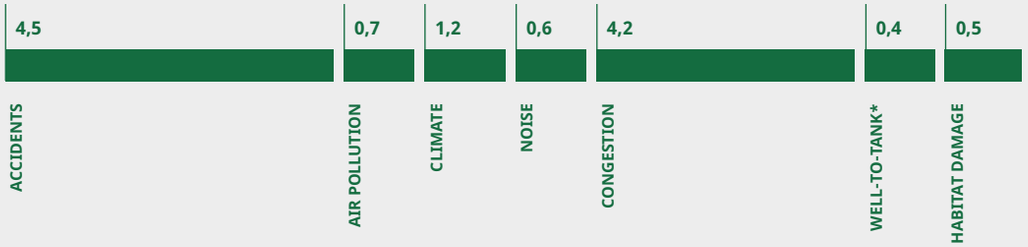
3,8 km

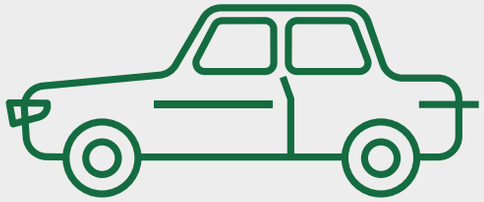
6,1 km



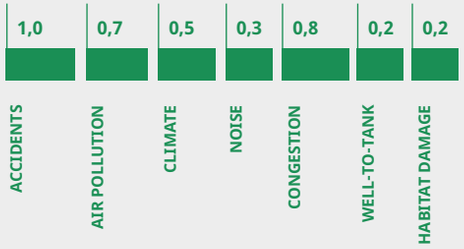
The true cost of motorized travel

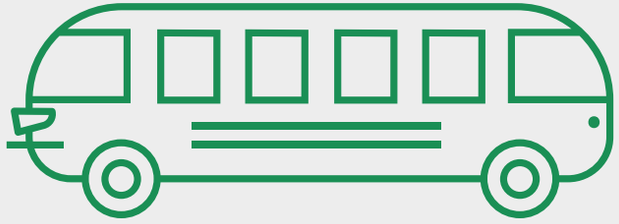
€-Cent/km





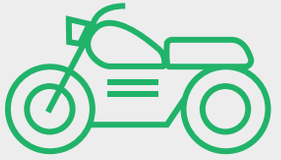
12,1
€-Cent/km





3,7
€-Cent/km

24,5
€-Cent/km



* Emissions necessary for the production of motive power for vehicles

Politicians and society have been discussing climate protection a lot these days. “To reach the goals of the Paris Climate Agreement, we need to make mobility climate-neutral,” says Greenpeace campaigner Marion Tiemann. “To do so, we need to use electric cars, when necessary, and reduce the number of our trips.” This is where bicycles come in. As half of the trips made by car are shorter than five kilometers, they could easily be made by bicycle.

A study by Oxford University revealed the following: If you left your car parked and got on your bike instead just once a day, you could reduce your personal CO2 emissions by 0.5 tons per year. If only ten percent of the population were to adapt their mobility behavior in this way, the emission savings would be around four percent of total car traffic. To put this into perspective: Average per capita emissions from motorized traffic range from 1.8 tons of CO2 per year in the UK to 2.7 tons per year in Austria.

“The bicycle can be the game changer when solving transportation problems,” says Stephanie Krone, spokesperson of the General German Bicycle Club (ADFC).

She feels that all political levels can and must help to make the bicycle become the favorite means of transportation once again. The Federal Republic, she explains, has to overhaul laws and regulations which are currently making it difficult to provide more space for bicycling. “It has to be said very bluntly,” says Stephanie Krone. “Bicycle-friendly conditions and space for urban life don’t just come from wishful thinking – but only from determined transportation-political actions and the redistribution of road space. It’s now time for town mayors to step up.”

Germanys National Cycling Plan 3.0

Germany is cycling towards a bicycle-friendly future: While the population cycled a total of 112 million kilometers per day in 2017.

The daily cycling volume is to double by 2030.

To achieve this, the National Cycling Plan 3.0 (NRVP) identifies four fields of action:

1. cycling & policy
   governance for strong cycling
2. cycling & infrastructure
   seamless cycling in Germany
3. cycling & people
   communication and education create cycling culture
4. cycling & economy
   Germany as a cycling location

Cycling infrastructure, a political challenge

Three questions, three answers
Stephanie Krone

Why is cycling a globally relevant topic?

Metropolitan regions all over the world have the same problem: More and more people, more and more traffic – which causes more and more congestion, accidents, poor air and less quality of life. So the search for better solutions is underway all over the world. The bicycle can be the game changer in the solution to transportation problems. It is the most efficient of all travel modes, it requires a tenth of the space of a car to park, a fifth when traveling. It costs much less than local transit and is affordable for everyone. It doesn't make any noise, protects resources and the climate. It promotes quality of life, social interaction among people – and health. The bicycle is an unbelievably obvious and simple solution to a whole number of our social problems.

What would political scope for action have to look like in order to create a nationwide cycling infrastructure that is more attractive?

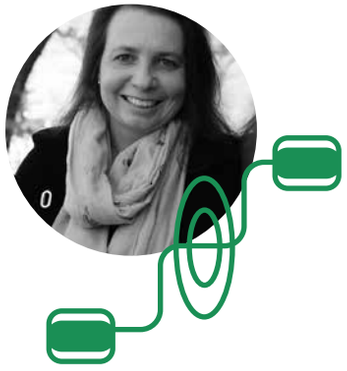
The Federal Republic has to overhaul laws and regulations: Road traffic acts and regulations as they are today make it unnecessarily difficult for communities to create more space and priority for cyclists. For example, cycle paths can only be mandated when cycling is or will be the dominant means of transportation. That is a hurdle which is much too high. And also protected cycle lanes have to be justified with accident figures and traffic counts. It should be enough to want to promote cycling or to fill a gap in the bicycle route network. Also a standard speed limit of 30 km/h, as has been recently introduced in Spain, helps improve the safety of vulnerable road users, such as cyclists.

What can cities and communities do? And what about municipalities?

Federal states are vital lynchpins. They have to design and coordinate the inter-regional bicycle route networks, create pools of specialist planners – and support communities in quickly getting federal funding from the climate package "Special Program City and Country" onto the roads. But the actual transformation happens in the communities: They now have to design new concepts for car-reduced life in the city and in the country, employ planning personnel and create a network with neighboring municipalities. They have to plan and build comprehensive bicycle route networks, set up bicycle highways for commuters, create millions of bicycle stands, defuse problem areas and dangerous junctions – and of course strengthen public transit and pedestrian infrastructure at the same time, because only together are these three a "winning team". This is where they need courage to leave behind old ways of thinking, demonstrate strong political willpower and invest more money.

Positive pedal pushing

Three questions, three answers
Prof. Dr. Angela Francke



Why is cycling different to other travel modes?

Cycling unites many benefits. On a personal level, cycling is beneficial to promoting and maintaining health, it is flexible and is almost always ready to use. In comparison to walking, it extends the personal range of coverage enormously and is very enjoyable. In particular for routes under five kilometers it is the fastest way of traveling in urban areas. In addition, cycling generates positive effects for the community: Cycling is environmentally friendly, quiet and space-saving – in particular when considering the fact that the average occupancy rate of a car lies at approximately 1.5 persons and that, as a rule, a car is parked for around 23 hours a day. Thus, more cycling enables more transportation to be processed on smaller areas and at the same time gains more space for a new urban design and living space in its literal sense.

According to what criteria do people get on their bikes?

One of the most important factors for using the bicycle is the individual subjective feeling of safety. Only when users feel safe and comfortable will they experience cycling as positive and relate this to enjoyment. In addition, cycling is an active form of mobility which results in the bicycle being attractive in everyday transportation on routes with low inclines and fewer detours as well as short traveling times.

What influences the subjective safety of cyclists?

In particular older and inexperienced cyclists feel threatened by the proximity to faster cars. The ADFC Bike-Friendly Cities Rating confirms that for 81 per cent of cyclists, it is very important or important to travel on roads separately from motorized traffic. Currently, the fact that there are too few separate cycle paths is one of the main reasons why cyclists feel unsafe. This should be counteracted with the help of infrastructural measures here, in order to also meet the needs of the increasing number of cyclists.

Cycling for the climate

Three questions, three answers
Marion Tiemann

How important is cycling for the transformation of transportation?

We won’t achieve the goals of the Paris Climate Agreement if we only concentrate on a change in drive technology. A fundamental reduction in motor-vehicle traffic is needed. For this reason, a shift from the car to the bicycle should be an absolute priority. Because a cannibalization within the environment alliance can only be welcomed in part. If we want to move commuters from the car to public transportation, the local transit system has to be attractive. In this case, buses and trains would have to do arrive frequently, the quality has to be right, buses and trains can’t be too full. For this reason, the burden needs to be alleviated on the short routes which people could cover on a bicycle. So if we manage a shift from local transit to the bicycle on short trips, we are directly facilitating the move from the car to public transportation for long distance routes at the same time.

How will cycling become more attractive?

It needs more space, more money, more rights. There needs to be wide and safe cycle paths in town centers. To achieve this, space must be newly distributed for the benefit of cyclists and pedestrians – even if this happens at the expense of the car. More specifically, a part of the parking lanes needs to be converted into cycle lanes, or where it is possible for example, one of two lanes should be integrated into the bicycle infrastructure.

From the point of view of Greenpeace, where have political failures occurred?

From our point of view, the benefits of cycling are not communicated enough. After all, it isn’t just about taking something away from someone, it is about the fact that everyone can gain. Examples such as Copenhagen and Amsterdam show that this is successful. These cities openly anticipate the true costs of motorized traffic. In Paris, Mayor Anne Hidalgo is taking a stance by saying that she isn’t fighting against the car but against air pollution. This clarity is great in my opinion. But she also needs political willpower and courage for the conflicts that have to be fought out in this regard.

Let’s get concrete!

Pop-up bike lanes, modal filters, and bicycle highways – various concepts in overview

Anyone who wants to create safe, comfortable bike paths shouldn’t think in terms of lighthouse projects, but should rather take a look at connections. “Nobody is helped with a 100-meter stretch of the nicest bike path imaginable if he or she then comes out at an unprotected crossing or has to push the bike,” says Prof. Dr.-Ing. Johannes Schlaich, who teaches in the field of mobility and traffic at the Berlin Technology University of Applied Sciences.

From pop-up bike lanes to modal filters to bicycle highways and conventional bicycle traffic guidance, we will present the **pros**[+] and **cons**[-] of individual concepts here.

“Mixed traffic is suitable if the speed differences between bicycle and motorized traffic are small,” explains Johannes Schlaich.

This is the case in 30 km/hour zones or on traffic-calmed streets. “However, mixed traffic also assumes that people behave rationally and are prepared to drive behind even slow bicyclists instead of passing them hectically,” continues Johannes Schlaich. An advantage of mixed traffic is that it doesn’t require any additional space and no new areas have to be sealed off. This way, there is more free space for green spaces, playgrounds, and living space.

The classic forms of guidance include bicycle traffic guided on the roadway. There are three options here:

1. Mixed traffic
2. Protective strips
3. Bicycle lanes

Spain sets speed limits – up to 30 km/h

For traffic calming and for a better interplay of all traffic participants, Spain is the first country in the world to introduce 30 km/h as a general speed limit in cities. With this, the country wants to reduce the number of accidents.

The rule change affects all streets with one lane in each direction. That's 80% of all urban streets. On roads with just a single lane for both directions and a sidewalk along the side that is at the same height, the speed limit is 20 km/h. Excepted from this are two- or multi-lane roads per travel direction. Here, the speed limit remains 50 km/h.

Reading tip:
The Federal Environmental Agency examined what the effects and non-effects of the 30 km/h speed limit are on main roads with regard to capacity, road safety, and pollutants and noise pollution.

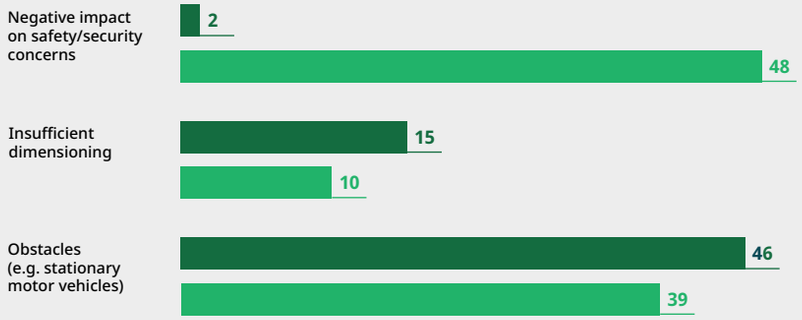
	⊕	⊖
Mixed traffic	No additional areas to be sealed off – More space for green spaces and other living space	Requires only slight speed differences between bicycle and motorized traffic (e.g. 30 km/h zone or traffic-calmed street) – Requires consideration – More than half of all accidents involving bicyclists at junctions happen due to turning or cross- ing vehicles
Protective strips	Offer bicyclists a little exclusivity	Not respected by 19% of mo- torists – Frequently blocked by stopped traffic, and thus cause accidents – Half of all motorized vehicles do not maintain the minimum distance when passing
Bicycle lanes	Offer bicyclists exclusivity and thus a bit more safety	Frequently ignored by motorists – Nearly half of all accidents with bicyclists at junctions happen due to turning vehicles – Approximately one-third of all accidents on the road happens due to turning or crossing vehicles – Half of all motorized vehicles do not maintain the minimum distance when passing

Protective strips and bicycle lanes separate the space for bicyclists visually from motorized traffic. While the bicycle lanes are intended exclusively for bicycle traffic, the protective strips offer only a little exclusivity. Both can offer bicyclists greater safety, however, this is tarnished. “Unfortunately, both forms don’t stop motorists from stopping or parking in these lanes,” says Johannes Schlaich. As a countermeasure, cities and communities can paint the lanes in color in order to distinguish them more clearly. “However, color is not infrastructure and is often ignored completely by some motorists,” says the mobility professor.

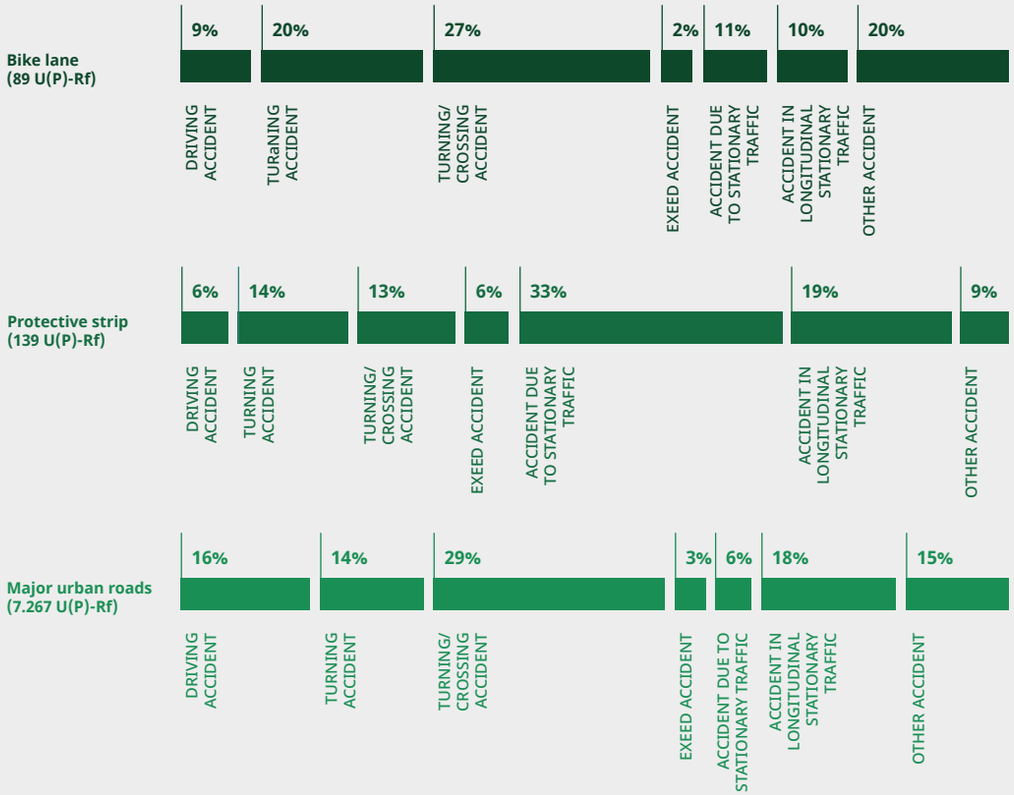
Nearly every 5th motorist does not pay attention to protective strips and bicycle lanes and uses them for stopping and parking.

Added to this is the fact that automobile, truck, and bus traffic passes bicyclists too closely. A research project of the UDV (German Insurers Accident Research) shows that every second motorized vehicle does not maintain the minimum lateral distance of 1.5 meters when passing: 15% maintain less than one meter distance, nearly one percent fewer than half a meter. The reason for this is that the passing motorized vehicles orient themselves especially by the lane marking and react only insufficiently to the position of the bicyclists.

This is how bicyclists and communities have experienced protective strips and bicycle lanes



Accident types on route sections



Guided on the side

Another conventional form of guidance is bicycle traffic guidance along the side of the road. Here, you separate bicycle traffic spatially and structurally from motorized traffic. The ADFC's bicycle climate test shows: It is important or very important to eight in ten bicyclists to be separated from motorized traffic when they are on the road. Among women, the figure is nearly nine in ten.

It is important or very important to 8 in 10 bicyclists to be able to ride separated from motorized traffic.

Thanks to the spatial separation, bicyclists and pedestrians are closer together: Painted-on markings, different surfaces, green strips or lowered curbs separate the areas from one another. "In the planning, cities and communities have to make two things clear," explains Johannes Schlaich. "On the one hand, junctions have to be configured so that vehicles can see the bicyclists early on in order to avoid collisions when turning." On the other hand, you must not forget that crossing pedestrians or vehicles coming out of driveways can hinder free travel. "Depending on what the edge conditions of the roadway are like, bicyclists might feel they can't go very fast and the route will then seem less attractive to them," says Johannes Schlaich.

	⊕	⊖
Structurally separated bicycle paths	Give bicyclists a greater feeling of safety – Offer bicyclists great comfort, especially if they are well-separated from pedestrians – Are especially suitable in areas with heavy traffic and main roads where the speed limit is 50 km/h or more	Require good planning at junctions, so that turning motorized vehicles see the bicyclists early on
Joint pedestrian and bicycle paths	Offer especially less confident bicyclists an option to travel spatially separated from motorized traffic	Great speed difference between bicyclists and pedestrians reduces the pedestrians' feeling of safety – Restricted comfort for both travel modes – Should only be used where better solutions are not possible for reasons of space and where bicycle and pedestrian traffic are very low

Copenhagen, an example for many

An interview with
Klaus Bondam

Commuting to work or school by bicycle – by 2025, this should be a matter of course for half of the trips in Copenhagen. The city was already very close to this goal in 2018: The bicycle share of trips was 49%.

Why do the citizens of Copenhagen ride their bicycles that often?

There are a whole series of reasons for this. I think first of all, we have established a tradition of bicycling: In Denmark, cars were very expensive because the government levied a lot of taxes on them. Copenhagen itself was a workers' city. Many people didn't earn very much, so the bicycle was an affordable means of transport. Of course, this changed. Especially after World War II and with the gentrification of the city. Nevertheless, cars are still not the means of transportation for daily use. Today, we like to call private automobiles "Louisiana Autos": The Louisiana is an art museum in the north of Copenhagen. Many people use their cars only to drive to the museum on Saturdays. For we in Copenhagen have the advantage that the city is very flat and the climate is never too hot or too cold to ride a bicycle. And last but not least, across generations, there has been a political readiness to invest in a safe, structurally separated bicycle infrastructure.

How does Copenhagen create this culture of bicycling?

Teaching children to ride bicycles is regarded as the parents' duty. It's just as much a matter of course as teaching them to eat with a knife and fork. Naturally, there are also families for whom bicycling isn't part of their family life; these families use their cars more. But it's important that children get a bicycle early and learn that traffic is a serious subject where you have to be careful – but this also makes children feel proud. Riding a bicycle is one of the first things for which children take responsibility and when they become mobile.

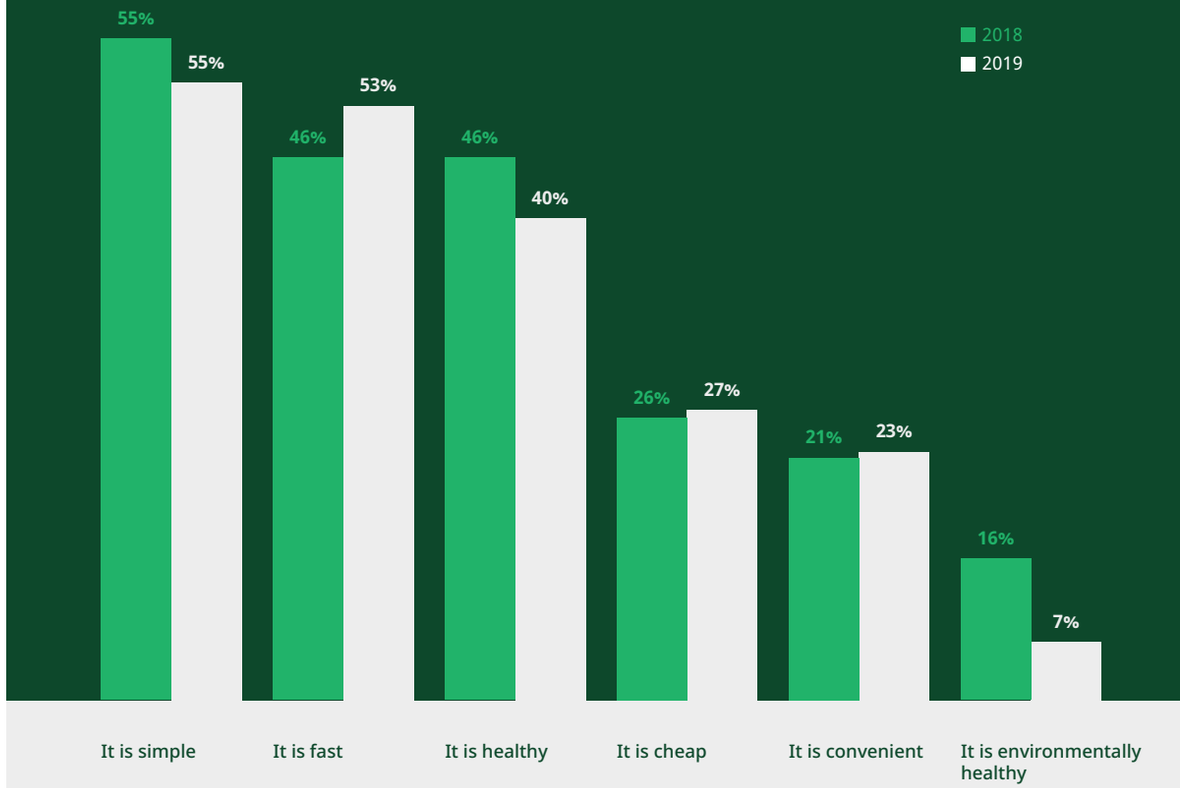
How are bicycle paths built in Copenhagen?

Here, bicycle paths are separated from motorized traffic by a curb. Some places, we also use parked cars to create a kind of protective wall from the traffic flow. In general, however, we believe that a completely separated infrastructure is indispensable for daily bicycling in the city. Currently we're in the process of widening bicycle paths from two to four meters because we have so many bicyclists and not every bicycle is a classic bicycle. Many people are underway on e-bikes today or they use bigger cargo bikes. Bicycling has become more diverse – with respect to the types of bicycles, speed, and also the usage groups. However, it's not just the bicycle infrastructure that's important for safe bicycling, it's also what's around it: To make bicycling safer, we have to slow automobiles down and allow fewer vehicles in the inner city. This creates a lot of political discussions.

How can these political discussions succeed?

If you want to have a public discussion, I believe it is important to develop a common language on the city council beforehand: What are we talking about when we're talking about infrastructure? What does it do for us as a community if we make our environment more bicycle-friendly? From surveys and studies, we know very precisely what the benefits of bicycling are: It keeps people fit, students who ride bicycles do better in school, employees who ride bicycles are absent less often. On the city council, you need a common understanding of the individual issues in order to conduct the public discussion.

This is why the citizens of Copenhagen ride bicycles.



Pop-up bike lanes and protected bicycle paths

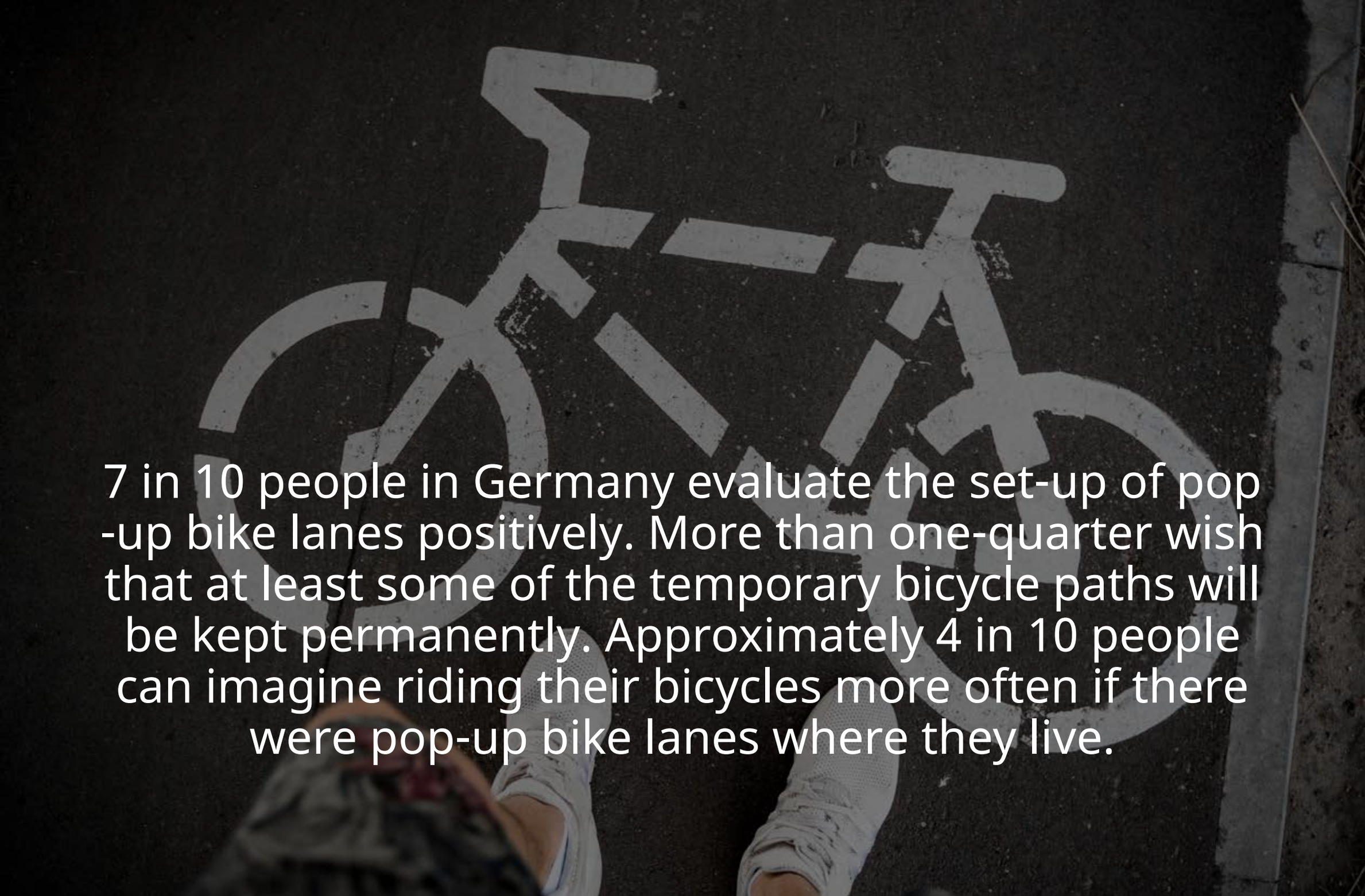
Originally an idea from North America, pop-up bike lanes popped up around the world during the Covid 19 pandemic like mushrooms from the forest floor. Pop-up bike lanes are temporary bicycle paths that are marked in color or delimited by barriers.

“Pop-up bike lanes are a kind of precursor to protected bike lanes. Protected bike lanes (PBL) are bicycle paths that are separated from automobile and pedestrian traffic by permanent constructed elements,” says Johannes Schlaich.“Pop-up bike lanes can be a good means of testing our ideas about bicycle infrastructure temporarily before you make them permanent.”

	⊕	⊖
Pop-up bike lane	Accelerator for encouraging bicycle traffic – No long approval processes – Ideal means for testing ideas for new bicycle infrastructure before it is made permanent	Frequently poor lane surface – Is very frequently hindered by stopped or parked traffic
Protected bike lanes	Increase comfort, speed, and feeling of safety for bicyclists	Required space causes reduction of the capacity for motorized traffic, the elimination of parking spaces and area paving

This way, cities and communities can try out whether the reduction of parking or the devotion of a lane to bicycle traffic has negative consequences on the rest of the traffic. Measuring the positive effects is a bit trickier because this usually requires long-term study: “It takes a certain time to grow accustomed to the paths, until bicyclists use the offerings,” according to the mobility professor. “People have to learn about the new option and bicyclists have to find their new preferred route.”

Pop-up bike lanes do not offer the same quality as a protected bike lane: Precisely on the right edge of the lane, bicyclists often encounter a worse lane surface since this lane has previously been used by buses and heavy trucks. And signal controls at junctions are not optimized in pop-up bike lanes – this is an important detail that cities and communities generally consider when setting up protected bike lanes.



7 in 10 people in Germany evaluate the set-up of pop-up bike lanes positively. More than one-quarter wish that at least some of the temporary bicycle paths will be kept permanently. Approximately 4 in 10 people can imagine riding their bicycles more often if there were pop-up bike lanes where they live.

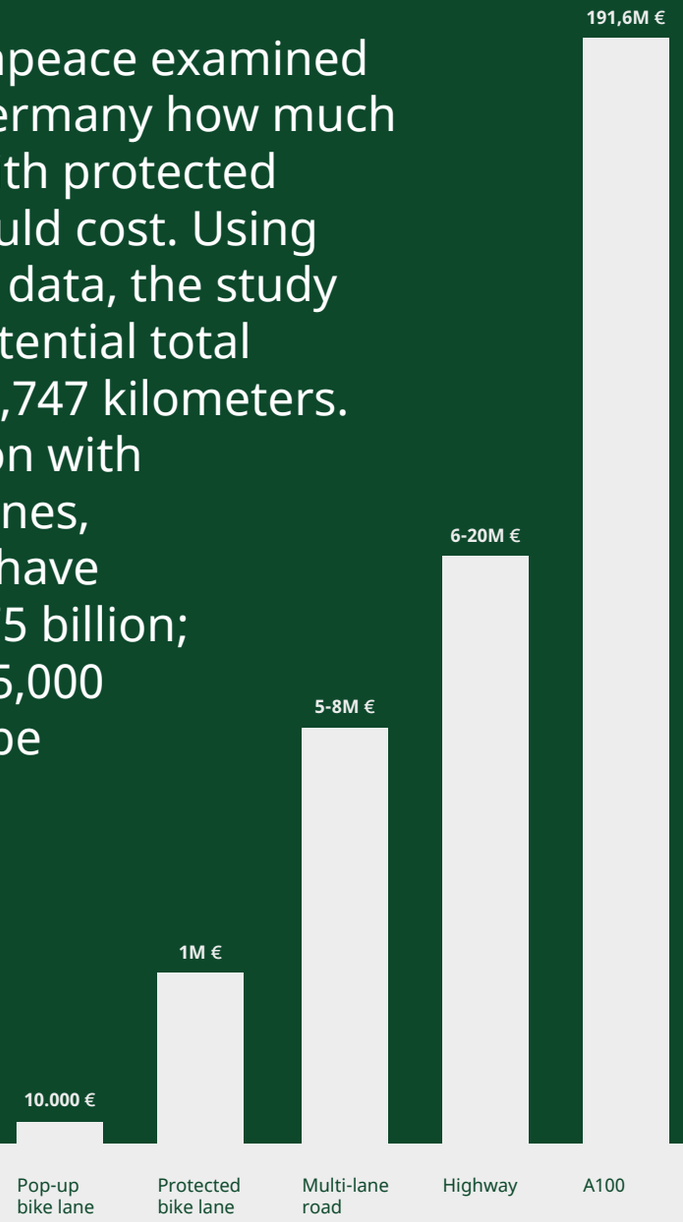
Protected bike lanes in Vancouver

People take nearly 9% of all trips and more than 13% of commuter trips in Vancouver by bicycle. Thus, the city's goal for 2020 was exceeded: The goal was 7% – and now it's well on its way to achieving the 2040 goal of 12%.

To further encourage this development, Vancouver set up protected bike lanes on the city's important streets. For example, along Dunsmuir Street.

This is what our road traffic infrastructure costs

In a study, Greenpeace examined for 30 cities in Germany how much the expansion with protected bicycle paths would cost. Using open street map data, the study determined a potential total route length of 2,747 kilometers. For this expansion with protected bike lanes, Germany would have to spend EUR 2.75 billion; in the process, 15,000 new jobs would be created.



Encouraging tactical urbanism

Three questions, three answers
Julie Anne Genter

During the pandemic, New Zealand was the first country to begin encouraging tactical urbanism with measures such as pop-up bike lanes. What was your motivation?

Due to Covid 19, using public transportation was very risky. We were afraid that the traffic situation would be catastrophic if everyone switched to automobiles. In New Zealand, thus far we had only very little safe bicycle infrastructure. Whether or not you can use a bicycle safely depends primarily on where you live. That's why we wanted to speed up the expansion and provide an infrastructure where people feel safe when they are underway on a bicycle or scooter.

How successful was the implementation?

Unfortunately, it didn't go as well as we had hoped. Many projects didn't really get off the ground. But here, our initial idea was that you should build infrastructure quickly and make it temporary in order to learn from it – instead of talking about it for a long time. So that you can see the effects of the measures, make changes if necessary, and, on the basis of what you've learned, plan something permanent later on. But many communities don't like to do anything without discussing it in detail first. Others made changes to the roads but didn't communicate enough. Sometimes this meant that they canceled their projects because they encountered resistance. The community did not understand why the measure made sense.

Is this a reason for you to give up?

No. We have to reduce our CO2 emissions from road traffic massively if we want to fulfill our obligations according to the Paris Agreement. Relying completely on electromobility would be wrong, and we probably couldn't afford this anyway. That's why we have to open the roads and motivate people to start riding bicycles and using public transport. We need a communication strategy so that people understand why we have to change our mobility behavior.

Modal filters are diagonal or crosswise blockades that cities and communities create by placing bollards or large planters at crossings. “Borrowing from the superblocks in Barcelona, modal filters are currently attracting a lot of attention in the course of neighborhood planning in Berlin,” says Johannes Schlaich. “They are not a typical element of bicycle traffic planning; instead, they serve to reduce cross traffic in residential areas or on individual blocks.” However, this form of traffic calming isn’t just good for residents and pedestrians; it also makes the roads more attractive for bicyclists since they can go fast and the dampened motorized traffic increases their feeling of safety.

Some cities also use modal filters to free up streets exclusively for pedestrian and bicycle traffic.

The zones blocked to motorized traffic fuel concerns on the part of retailers: They frequently assume that passers-by buy less. However, various studies have shown that bicycle streets cause businesses to flourish. Bicyclists’ purchases tend to be smaller, but they visit the stores more frequently. Thus, retail establishments make 10% more sales on average from bicyclists.

	⊕	⊖
Modal filters	Reduce through traffic – Diverting traffic at intersections and junctions reduces the speed of motor vehicles – Less motor vehicle traffic increases road safety for cyclists and pedestrians	Requires good communication among residents using their cars – Parking spaces are eliminated
Bike roads	Comfortable and fast option for cyclists – Offer especially uncertain bicyclists an option to travel separated spatially from motorized traffic – Have positive effects on retail	Requires good communication among residents using their cars

Roadmap for road space real location

Those who wish to implement modal filters subsequently reallocate the public use of a road to specific types of use or user groups. In technical jargon, this is referred to as road space reallocation. According to the ADFC [German Association of Cyclists], the process of reallocating road space takes roughly 6 months.

Traffic regulation
(weeks)

1 Creation of the traffic sign plan

4 Road traffic law hearing

1 Road traffic regulations

Administrative process of road space reallocation (weeks)

1 Position statement on the subsequent restriction of the types of use/group of users (road space reallocation), arguments in favor of restrictions provided by the civil construction office

4 Consultation of the road traffic authority and written statement (possible in 1 week)

2 Announcement sent to the Official Gazette

5 Advance notice in the Official Gazette and period for objections by citizens

2 Notification of road space reallocation in the Official Gazette

5 General decree of road space reallocation/ obtaining legal certainty

15-minute city and automobile-free inner cities

“For too long, those of us who live in large and small cities have accepted the unacceptable,” declared Carlos Moreno in fall 2020 in his TED Talk. “We accept that our time sense is distorted in cities because we have to spend so much time in order to adapt ourselves to the absurd organization and long distances in most cities today.” This scientist teaches at the Sorbonne in Paris and is an expert in human smart cities. His concept for modern urbanism: To design cities so that everything that people need to live can be reached on foot or by bicycle in 15 minutes – home, work, items for daily consumption, health care, education, culture, and recreation.

One city that follows this concept is Paris: Here, Mayor Anne Hidalgo has set the goal of reducing environmental pollution and increasing the air quality and quality of life. In order to do this, she decided to give bicycles more space – especially at the cost of automobiles:

At the beginning of 2021, she revealed that she wants to eliminate 72% of all parking spaces and transform these into bicycle lanes. In addition, Paris decided to calm the traffic on the Champs-Élysées and make the surrounding areas greener. This way, the 70-meter-wide showcase street will become an attractive park.

With changes such as these, Paris is setting new priorities step by step: For example, the French capital had 750,000 private cars in 2003; in 2014, there were only 613,000. 14% fewer parking spaces made for 18% fewer private cars in this city of millions.

“In a time in which our world is under the influence of great technological, economic, social, ecological, and political changes, in urban spaces, all of the challenges of our future development are becoming crystal clear. And yet – tomorrow’s city, like yesterday’s, has to be a meeting place, a place of exchange, of life, a city for women and men who live there and make it lively.”
Carlos Moreno

Automobile-free inner cities are not just a topic for metropolises; even small cities are focusing increasingly on prioritizing pedestrian and bicycle traffic. “For example, we conducted a potential analysis for Bad Dürkheim to see how much CO2 emissions this city in Rhineland Palatinate could save by encouraging local mobility,” reports Verena Zeidler, project engineer at PTV Transport Consult GmbH. Bad Dürkheim is a county seat in the Rhine-Neckar metropolitan region and encompasses an area of nearly 103 square kilometers. For the potential analysis, PTV Transport Consult examined the number of trips that were less than five kilometers long and could be managed on foot or by bicycle. “In total, we found 29,000 paths that could be shifted realistically each day,” says Verena Zeidler. “By encouraging bicycle traffic, we could save 1,500 tons of CO2 emissions per year.“

That traffic shifting can succeed even outside the large cities is something that the Arbeitsgemeinschaft fußgänger- und fahrradfreundlicher Städte, Gemeinden und Kreise in NRW e.V. [working group for pedestrian and bicycle-friendlier cities, communities, and counties in NRW], or AGFS for short, has demonstrated. Here, more than 90 communities have joined together to exchange experiences and take advantage of expertise in order to develop concepts for better quality of living and movement in the cities.
“Our common goal is to increase local mobility in North Rhine-Westphalia’s communities,” says Christine Fuchs, Chair of the AGFS. According to “Mobilität in Deutschland 2017” (MiD) [“Mobility in Germany 2017”], 43% of the trips that are taken with automobiles are shorter than five kilometers. Every fifth automobile trip isn’t even two kilometers long. If residents increasingly cover these short distances on foot, with bicycles, on inline skates or kickboards and forego automobiles, the AGFS believes its goal can be achieved.

To achieve the goal, Christine Fuchs believes that different “gears” have to mesh with one another: “Mayors and the administration have to be convinced that local mobility is the right concept so that they want to advance projects in this direction. The internal attitude has to be right,” she says. “Then the right infrastructure for bicyclists and pedestrians has to be created.” This implies appropriate planning, decision-making, and financing. Quick routes for bicyclists would be a plus, but they would work even better if they were networked with one another.

“High-quality bicycle parking, links to public transit, and service offerings such as vending machines with new bicycle tubes or air pumps that people can use for free make cycling more attractive for residents,” says Christine Fuchs.

For pedestrians, for example, it is important to have enough public benches and toilets available. These would especially enable seniors to walk more.

If the infrastructure is adapted, then the concern is to encourage changes in residents’ mobility behavior. “Campaigns can help here,” says Christine Fuchs. However, communication does not necessarily have to appeal to people’s environmental awareness. “Health is a basic human right,” says Christine Fuchs. “If cities and communities motivate people to incorporate more movement into their everyday lives in order to live healthier, this statement usually motivates more people than saying ‘for the environment’. But without the right high-quality infrastructure offerings, the best campaign isn’t worth much.”

Bicycle highways are suitable for expanding people's movement radius. "This is how I handle my existing time budget, and, if they are made well, also arrive at further-away destinations safely," says mobility professor Johannes Schlaich. "This increases the potential for bicycle traffic, because this way, even longer routes are more attractive for bicyclists." E-bikes can also play out all their strengths on bicycle highways.

"Bicycle highways are a sign of comprehensive planning of bicycle traffic," says Verena Zeidler. "In Germany, for the planning and construction of bicycle highways, there are numerous criteria that should actually be considered for all bicycle infrastructures. Otherwise fundings do not apply."

Thus, for example, good illumination is prescribed, as are ground markings and signs. "This catches your eye and motivates you to get on your bicycle," says the project engineer at PTV Transport Consult.

But where to begin?

Changing infrastructure in order to give cyclists more space is often obstructed by numerous concerns, just as: Where does the motor vehicle traffic shift to, if I rededecate a road to the bicycle? How can traffic lights be optimized so that both, motor vehicle traffic and bicycle traffic get from A to B quickly?

By creating demand-based transport models with the transportation planning software PTV Visum, transport planners are able to investigate on measures and questions like the above mentioned in advance. The PTV Vissim software supports traffic engineers in looking at details: for example, they can optimize and visualize individual junctions for different road users by using the world's most advanced and flexible traffic simulation software.

Modal shifts in transportation – an interaction

For an initial potential analysis, you look at larger areas: Where do people live? Where do they work, go to school, and shop?

"When your aim is to create a better and stronger cycling movement in your community, the network always comes first. You need to know the status quo to improve the situation. Based on the analysis, you can then use the transport model to estimate potentials and hence plan the routes," explains Verena Zeidler.

This way, cities and communities can gain an overview of whether an infrastructure idea will have a positive effect and create more bicycle traffic. "Then you have to look where the new bicycle path might be built," says Verena Zeidler. For greener mobility, it also applies that ideally, no new areas should be paved over. "Existing paths alongside rail tracks are ideally suited for transformation into new bicycle infrastructure," says Verena Zeidler.

Once the rough planning has been done, the focus is on the details. Here, you examine not just the main relation, but also what potential you could achieve along this corridor. “To do so, you generally build a precise transportation model, which you feed with relevant structure data and with which precise demand can be modeled,” explains Verena Zeidler.

This way, cities and communities see, for example, what effects an bicycle highway between two cities or suburbs or destinations along the route will have.

“The planning of cycling infrastructure requires the same care and precision as in motor vehicle traffic”, says Verena Zeidler. “Thus, the methods and requirements for a detailed and realistic mapping of cycling behaviour is constantly developed further.”

How to get started:

With PTV software and services, cities and communities can get an idea of the cycling cultur and behaviour in their region based on proven methodology, which support a sound analysis.

- **Feasibility studies**
  Forecast the effects of infrastructure measures for cycling on the modal split. Perform a cost benefit analysis for those measures and make your decision by using a defined rating system with specific evaluation criteria.

- **Network design**
  Network analysis, development of measures and activities (expansion eneds, identification of routes and route alternatives). Find out where important corridors for potential bicycle infrastructure may be.

- **Transport modelling**
  Integration of mode and route selection into the model, quantifying the impact of transport measures. Get information on where people do start their bicycle trips and where they take them to.

- **Mobility concepts**
  Status analysis (infrastructure, chances and challenges), defining objectives and measurements that consider all modes of transport, motorized or active, equally.

- **Road safety**
  Bike accident analyses resulting in the development of measures.

- **Streetscape concepts**
  Conception of cycling facilities, streetscape design and layout.

- **Linking bike & Public Transport**
  Service planning for Bike + Ride, bikesharing and bicycle transport.

- **Traffic lights coordination**
  Investigation of the possibilities and effects of giving priority to cyclists at the traffic signals (“green wave”).

To learn more about our work in the field of active mobility, visit **http://ptv.to/bicycle**

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