

Cycling for Sustainable Cities

Questions & Answers



Please note, due to many questions we received in the webinar, responses are provided to a selection of questions that are within the scope of the book.

1. What are your views on e-scooters and other electric mobility devices? Are they a good alternative from a sustainability perspective, and do you think they will be adopted en masse? Do they generally go with the bikes, or with the pedestrians?

John Pucher (John): I am not a fan of e-scooters at all. My personal opinion is that they are much more dangerous than bicycles. They appear to be a big hit with adolescents and young adults, however. Where I live in the Raleigh-Durham-Chapel Hill metro area (2.1m population) in North Carolina, they are often ridden recklessly, especially endangering pedestrians, but also themselves, as I see them often riding through red lights and stop signs and ignoring all traffic regulations, and never wearing helmets.

Ralph Buehler (Ralph): Shared e-scooters have captured a large market share of shared devices in the US. They account for more trips than all bikeshare systems together, while bikeshare has been around for 10 years compared to three years for e-scooters. We did a paper looking at e-scooter parking and pedestrians and there are clearly different perspectives among scooter riders and non-riders (<https://www.mdpi.com/2071-1050/11/20/5591>).

2. Do you have any tips for managing conflicts between pedestrians, cyclists, e-bike and other e-mobility device riders in constrained urban environments where there's only space (or funding) for shared facilities?

John: I encounter this situation almost every day on the 350 miles of mixed-use greenways and trails here in the Raleigh, NC metro area. The best general solution I can think of is for slower users to stay to the right, with faster users passing on the left (given our North American system of driving cars on the right side of the road). There must be frequent signage for all users to respect each other, so signal when passing, and to slow down when things get crowded, which often happens here on the weekend.

Ralph: My guess is that in cities there is more space, it is just reserved for cars. In these constrained urban environments, we may have to think of taking space from cars and prioritise pedestrian and cyclists in such narrow urban spaces. On trails, as John mentions, slower users should keep to the right and faster users should pass slowly and while watching out for slower and more vulnerable users.

3. With the recent rapid uptake of e-bikes, was the environmental issues relating to life of batteries, disposal or recycling considered as part of sustainability?

John: I feel sure there have been studies about this, but I have not seen them. Without question, there are significant environmental issues in both the manufacturing and disposal of batteries used for e-bikes, e-scooters, and e-cars. Moreover, the generation of electricity to charge those batteries causes environmental damage. Thus, traditional bicycles are much, much more environmentally friendly than any of those battery-powered alternatives. They are preferable to conventional, gasoline powered motor vehicles, but they are much less environmentally friendly than pedal bicycles. Moreover, the health benefits of traditional bicycles far exceed those of the battery-powered alternatives.

Ralph: I think there is a net negative effect on the environment if a trip is shifted from normal bike to e-bike. However, if other users are attracted to bicycles and shift from car trips, there is a net gain for sustainability. The same is true if older adults can cycle for longer in their life due to e-bikes or if people can now make additional trips by bicycles. I think there was a study by Oxford university that looked at this issue recently: <https://www.ox.ac.uk/news/2021-02-02-get-your-bike-active-transport-makes-significant-impact-carbon-emissions>.

4. In relation to slide 55, is there a similar graph for the probability of a fatal injury for a pedestrian colliding with a bicycle (or e-bike or e-mobility device)?

John: I have just done a Google search, but all I can find is studies of the rising risk of pedestrian fatalities as car speeds increase. I do not know why this same sort of risk assessment has not been done for cyclists. But I would expect it to be similar, not the same, but similar. It would depend on whether the cyclist is traveling in the same direction as the car, perpendicular to the car, and other factors as well. The fact that it would be more complicated to calculate might explain why there have not been similar studies for cyclist risks. Too many complicating factors.

Ralph: I have not seen any for cyclists. My guess is that it would look different due to the higher positioning of the cyclist compared to the pedestrian. The speed of the cyclist would also matter.

5. How important is off-street bike parking provision? E.g. are the planning scheme bike parking rates for residential and destination off-street parking significant to a modal shift, as well as bike parking design and facilities such as showers? How should you measure the off-street bike parking rates needed such as for Australia cities with existing low cycling rates?

John: I don't think there have been quantitative, statistical studies of the impact of off-street bike parking, but it is obviously crucial for residential apartment and condo buildings and for commercial buildings, both for workers and shoppers/customers/clients. Case studies show that the provision of off-street parking, as well as showers and change facilities, at the workplace can greatly encourage cycling to work or university.

Ralph: We reviewed the literature on bike parking, and it matters a lot for general cycling, but also cycling to work and cycling to public transport:

Heinen, E., **Buehler, R.** 2019. "[Bicycle parking: a systematic review of scientific literature on parking behaviour, parking preferences, and their influence on cycling and travel behavior](#)," *Transport Reviews*, Vol. 39, No. 5, pp. 630-656.

Other factors related to bike parking matter as well, like showers and lockers at work:

Buehler, R. 2012. "[Determinants of Bicycle Commuting in the Washington, D.C. Region: The Role of Bicycle Parking, Cyclist Showers, and Free Car Parking at Work](#)," *Transportation Research Part D: Transportation and Environment* Vol. 17, No. 7, pp. 525-531.

6. How do you convince community and road agencies to accept lower levels of service (by removing space for cars), when all their programs focus on network efficiency for cars?

John: It is a very difficult task, especially in very car-oriented countries like Australia, NZ, the USA, and Canada. In most cities, it is a constant battle for street space. I am not aware of any one solution for convincing the public, politicians, and transport engineers and planners that it is worth transferring roadway space from cars to bicycles. European cities have been much, much more successful at doing this, but even in Europe, shifting roadway space from cars to bicycles can be a battle. The advantage in Europe is that there are much, much better alternatives to the car than in the USA, Australia, and Canada. A wide range of restrictions on car use is already in place in most European cities, and petrol prices are about three times as high as in the USA.

Ralph: This is a difficult process. One could be political will from the mayor or city council. But I think engineering guidelines and education have to change. Engineers learn about these standards and take them as objective truth. However, these standards are biased towards car travel – many of them came about in times for skyrocketing car use and with the goal to facilitate car travel. Many of these standards do not have a sound scientific basis (e.g. parking minimum standards or travel demand forecasting that essentially only focused on motorised travel and on moving things over ever longer distances). I see trends among younger engineers to have an understanding about this and more critical eye to the standards. Often engineering standards are not based on proper study or objective information at all. These standards were written down to facilitate car travel. We could also politically try to replace LOS with other measures like VMT reduction. I think California is doing this.

7. John, you mentioned that policy decisions about land use/transport influenced changes seen in UK – can you comment on need for integrated land use and transport and why we don't see more of this globally?

John: Land use is definitely crucial to encouraging more walking, cycling, and public transport use. Indeed, land use is probably the main reason that it's been so difficult to reduce car use in the USA, Canada, and Australia. There is a very hopeful trend here in US cities over the past 10-15 years, at least in city centres and suburban subcentres: a very strong emphasis on integrated, mixed-use development that is far more conducive to walking, cycling, and public transit use. Even here in the Raleigh-Durham-Chapel Hill metro area (2.1m population), almost all the new developments in the inner areas of Raleigh and Durham (the two largest cities) are explicitly mixed-use by design, with residential and commercial often in the same buildings on different floors, or in building next to each other. Unfortunately, new development (mainly residential but also shopping centres) in suburban and exurban parts of US metro areas continues to be very car-oriented, with most single-family housing far from commercial centres, thus requiring car use. It is not just the density of development that matters but also the specific street layout and urban design. Many books (by urban designers) have examined this in great detail with documentation and illustrations of what sorts of development are necessary to encourage walking, cycling, and public transit.

Ralph: Land use is very important and land use policies can facilitate cycling. However, we are trapped in a vicious circle between land use and transport planning. Transport planners forecast more car travel and build more highways, more highways allow new settlements further out, the new settlements forbid mix of land uses and thus create more travel. This leads transport planners to project more driving demand. Land-use planning has to allow for more mixed land uses and a finer mix of uses to facilitate shorter trip distances.

8. Do you find the negative effects of cycling amongst pollution within cities outweigh the positive benefits of the cycling activity itself?

John: It depends a lot on how bad the pollution is. In extremely polluted cities, such as very large cities in India and China (with pollution levels considered "hazardous" by the WHO), I would guess that the health dangers of cycling and walking outdoors might offset whatever health benefits there might be. I think in Australian, NZ, US, Canadian, and European cities, levels of air pollution are much, much lower than in China and India, and that the negative impact of air pollution on cyclists is far offset by the health benefits.

Ralph: We have to keep air pollution low and offer cyclists routes that are less polluted. The solution is to reduce emissions from cars. This is again another example how driving endangers other mode users. The solution is not to reduce cycling but reduce driving and its emissions.

9. What do you see as the critical questions that should comprise an annual national bike travel survey that will ensure Australia can better harmonise with international bike data?

John: I am sorry, but this question would require many pages to answer. Whoever is interested in this should take a look at the national travel survey for the USA, which is extremely well documented by USDOT. You can see there exactly what sorts of questions are asked in the travel survey as well as the methodology used: This website lists a wide variety of publications on all aspects of the 2017 NHTS, the latest available: <https://nhts.ornl.gov/publications>.

Ralph: The mode share data we presented for countries were based on national household travel surveys. Only a couple of countries have them. I found the paper here from 2011 that looked at NTS with the goal to propose one for Australia: <https://www.semanticscholar.org/paper/National-household-travel-surveys%3A-the-case-for-Stopher-Zhang/317b94beec0053d95f0a39a1688e1901be28cfd1>.

Canadian researchers also try to make the argument for a NTS for Canada.

There are some variations. The big surveys in the USA and Germany, but also Austria are country wide, use a complicated sampling method and are relatively costly, depending on the incentives used for completing the survey. There has been a recent trend to allow respondents to reply online. Typically, households are assigned a travel day and they report all trips for their household during a day using a trip diary where they record every trip, distance, time, purpose and mode. In some countries, like the UK, but also a second German survey the sample consists of a rolling sample. In Germany's case they have 3,000 people (or households?). I think for the country and people stay in the survey for 3 years, so every year about 1,000 people/households rotate out. I think in the UK it is even smaller and they then use data for three years to report an average over the last three years.

Cities often have travel surveys, but typically for the purpose of travel demand forecasting and they tend to focus on motorised travel. In particular in cities with low bicycle usage, there are only a few cases in these surveys. I think the 2007 survey for the Washington, DC area only had 100 people reporting bike trips in the entire survey. Now they changed the survey and got much better numbers.

10. I heard of the term "sustainable safety." What is that in the context of cycling and cycleway infrastructure?

John: Sorry, but I have never heard of the term "sustainable safety" and would have to guess. A much more frequently used term is Vision Zero, meaning reducing fatalities and serious injuries as low as possible, with no level being too low, thus the zero.

Ralph: I am not sure either. I think safety is part of a more sustainable transport system. A transport system that kills many people is not sustainable.

11. Was there a reason to not include New Zealand cycling statistics in your study?

John: We did not deliberately, explicitly exclude NZ, but we had limited time to gather travel survey information, and I felt certain that, similar to Australia, NZ has only the work trip data from the Census and no national travel survey. I would expect that the percentage of trips by bike (for the trip to work) is even lower in NZ than in Australia, but that is just a guess. I just looked this up in a Google search and saw that the bike share of work commuters in NZ cities ranges from about 1% to 3%, but I don't see a national average. Here is the official website of the 2018 NZ Census, the part specifically about the journey to work, but I can't figure out how to use it to determine the national average percentage of work commuters by bicycle: <https://datafinder.stats.govt.nz/data/category/census/2018/sa1-dataset/sa1/?s=a>.

Ralph: We only had access to some census data but not travel survey data for all trips. Many of our graphs are based on all trips.

12. Great book and great talk, thank you. Ralph discussed the impact of local policies. Have you seen success stories in metro areas with fractured governance? For example, in Sydney the roadways needed to make potential cycle routes span several political entities, including several local councils and the state-wide traffic authority.

John: Political fragmentation is a huge problem in virtually every US and Canadian metropolitan area, and that has made the integration of cycling facilities very difficult. For that very reason, all of our data on miles of cycling facilities are limited to the central political jurisdiction in each US metropolitan area, same in Canadian cities. In some metro areas, there is a lot of competition and little cooperation among the many different local political jurisdictions. There are exceptions, however. In the adjacent cities of Boston, Cambridge and Somerville, Massachusetts, for example, the three cities have pro-cycling policies, and their bike planners work together to ensure that their cycling infrastructure is well integrated. That is a special case, perhaps, because the Boston metro area is so university-oriented, with almost 300,000 university students, and with a very progressive, pro-environmental political culture. I think that sort of coordination could also be found in other university towns, especially with coordination between the universities and the towns in which they are located. But in general, the extreme political fragmentation of US and Canadian cities makes integration of cycling facilities difficult. The central cities are much, much more interested in cycling and improving cycling facilities than the suburbs. There is very little public and political support in the suburbs for improving cycling facilities unless they are completely off-road and do not compete with roadway space for cars. This is true in both US and Canadian cities.

Ralph: Yes, fragmentation is an issue, but it can be overcome. We see it every day in roadway networks. They are able to connect the roadways across jurisdictions. Roads do not just end at the municipal boundary in general. Thus, it is possible to do this for bicycling. The political will is just lacking.

13. Question regarding the shared space in Vienna, do you have thoughts on the incorporation of hostile vehicle barriers in that context? Is this a new complicating factor?

John: I am not sure what a "hostile" vehicle is. That is a new term for me. The shared street in Vienna, and indeed shared streets of other kinds (such as Spielstrassen, Woonerven, Home Zones) only work IF motorists are clearly responsible, legally, for not endangering pedestrians, cyclists, and other vulnerable road users, and IF the priority of vulnerable road users is strictly enforced by the police and courts. The cars in the video travelled extremely slowly and with great care to avoid hitting other road users, but this is not due to any physical road infrastructure measures but rather due to motorist training in those countries, clear signage, and strict enforcement. I think that shared streets would be more difficult to implement in countries like Australia, NZ, USA, and Canada because we don't have the sort of strict motorist training and laws giving strong priority to vulnerable road users.

Ralph: Several pedestrian zones have movable bollards that can move up and down with an access fob or code. This is fairly typical in many European cities. The idea is exactly what you mentioned, avoiding a possible terror attack by a car or truck driver. I have not seen any discussions around the shared street in Vienna.

14. What are the three most important policies a local government can implement to increase cycling?

John: My personal opinion: 1) traffic calm all residential neighbourhoods to 30km/h or less and prevent through traffic with diverters and other infrastructure to force cars to slow down; 2) reduce motor vehicle speed limits throughout the city and strictly enforce those lower speed limits with speed cameras that automatically ticket motorists (as in Germany) for violations; 3) build an integrated, fully connected network of protected, low-stress cycling facilities along arterial roads that connect with regular bike lanes on less heavily travelled, slower speed roads, and with traffic calmed neighbourhood streets without any special cycling facilities, but with very little traffic and very slow speeds.

Ralph: I agree with John, separate bikeways where you have fast moving or high levels of motorised traffic; integrate that network and connect it; as well as traffic calming of all other roadways in neighbourhoods (including physical alterations, not just stop signs as here in the US). This allows cyclists to cycle on all roads in the city.

15. Has there been a study that compares bicycle use in cities based on population densities and urban form (a challenge for Australia), climate (some middle east countries) and topography (a city like Istanbul)?

John: Peter Newman and Jeff Kenworth in Perth did several global studies of the relationship between these factors, but that was back quite a few years. Their latest book “The End of Automobile Dependence” was published in 2015. “Sustainability and Cities: Overcoming Automobile Dependence” was published in 1999. I am certain that their 1999 book examines the factors you mention, but I’m not sure about the 2015 book. Surely, there must be many other studies out there that examine these relationships as well. In short, the studies definitely exist, but you just have to search Google Scholar, Web of Science, or Scopus to find the studies.

Ralph: I have seen it included in papers as control variable (when studies focus on other issues). For example, in our paper we found that less sprawl was related to more cycling to work in the US: <https://link.springer.com/article/10.1007/s11116-011-9355-8>.

Here we found that density variability within Washington, DC did not matter once we control for other factors. However, we only looked at the urban core and there was not much variability in density (no suburbs included): <https://ralphbu.files.wordpress.com/2015/03/determinantsofbicyclecommuting.pdf>.

16. In Australia, cycling projects are still largely skewed towards recreation. How do we get the decision makers to regard cycling as transportation?

John: That’s a tough one. In countries such as the USA, Canada, Australia, and NZ, there is huge public and political support for off-road greenways, trails, and paths that do not take away roadway space from cars, and which are low-stress, safe facilities for users. Some of those off-road facilities can also be used for longer-distance commuting and other practical trip purposes but they are overwhelmingly recreational. The biggest obstacle, by far, to a greater focus on cycling for practical, utilitarian transportation is land use. Except for inner city areas, most daily trips for utilitarian purposes (including work commuting) are either too long to make by bike or require trip chaining, such as going from work to the school to pick up children, then grocery shopping and then home. That is much more difficult to do by bike than by car, at least in car-oriented sprawled suburban and exurban areas. I live in such an area here in the northern part of Raleigh, North Carolina. Almost all of the places I need to get to are much too far away (and in many different directions) to cover by bike. I cycle about 20 miles per day (weather permitting) but it’s all for recreation and exercise. Not for practical travel needs. When I lived in central NJ, I did not even own a car for 40 years and was able to get almost everywhere I needed to go by a combination of walking, cycling, and public transit. That car-free lifestyle in central portions of the NYC-NJ metro area is almost impossible in any North Carolina city, and truly impossible in outer suburban and rural areas.

Ralph: There are some opportunities where these two issues fall together, like the Midtown Greenway in Minneapolis that serves commuters and recreational cyclists. In fact, it is partly the backbone of all other cycling facilities there with most on-road lanes connecting to it. Thus, in an ideal scenario you are able to have a facility that serves both uses. In Europe there seems to be a reconsideration because of CO2 emissions and climate change. This seems to give more support for utilitarian cycling. One other aspect could be traffic congestion during the commute. Shifting trips to bicycling can help save money and avoid expanding roadways.

17. Protected bike lanes require the removal of on-street parking, which can be a great challenge. How can we get around this?

John: It is definitely a political battle in most cities in the USA, Canada, Australia, and NZ. Motorists assume they have the right to park their cars for free on the roads, and taking away car parking is a battle wherever it is done. European cities have been most successful with this, and the reason is two-fold: Europeans have a much, much longer history of restricting car use and making it more expensive, and that includes, importantly, the removal of on-street parking and moving it off-street into parking decks or garages that charge quite a bit for parking. The second reason is that European cities provide far superior alternatives to car use: much better public transit, walking, and cycling facilities. Thus, the combination of carrot and stick policies in Europe is possible. In the USA, stick policies are not only politically very difficult (due to intense opposition from motorists), but the opposition has the argument (certainly true here in Raleigh, NC) that there are no good alternatives to car use. So it's sort of a Catch 22 situation here in the USA and Canada, probably in Australia as well.

Ralph: I think it needs political support to do that. It may be first feasible on roadways with excess capacity only. Once cycling levels increase and there is more support for cycling it may be easier to take out parking. Often it comes down to political will from the city council. It is very difficult in car dependent countries where motorists take free parking for granted. Our paper on Frankfurt and Washington, DC shows how this process evolved over time. Often starting with simple bike lanes and occasional protected bike lanes and then later moving to more protected bike lanes and a higher standard of bike lanes: <https://www.mdpi.com/2413-8851/5/3/58>.

18. The definition of a bicycle differs substantially between countries: the EU uses the 259w pedelec specification, Canada and USA don't demand pedal assistance and up to 759w electric. Switzerland 400w. How much do these differences affect the "bicycle" data used and discussed?

John: I know almost nothing at all about e-bikes. So I am unable to answer this question. The authors of the chapter on e-bikes surely examine this very issue in their book chapter. I suggest that you read the superb chapter on e-bikes by Chris Cherry and Elliot Fishman (chapter 9) in the book. They comprehensively examine a wide range of topics related to e-bikes, including the various kinds, speeds, designs, horsepower, even with illustrations.

Ralph: I would have to refer to the chapter authors as well. I am not sure if there have been comparisons of the impact of the specifications on cycling levels and uptake of cycling. This would be an interesting international comparison: how do technological regulations of e-bikes affect uptake of e-bikes in various countries. However, you would have to control for many other factors to isolate the effect of the definitions and technological specifications.