

Better public transport does not reduce car emissions¹

Arie Bleijenberg²

Public transport is seen as an alternative to the car and therefore as a way to reduce pollution from car traffic. Indeed, trains, trams and buses are cleaner than cars. But will people leave their cars because of better and cheaper public transport?

In short

- Better and cheaper public transport will hardly result in less car traffic.
- Public transport contributes to a strong economy and has an important social function.
- Car mobility is reduced by spatial concentration of homes and businesses and by limiting space for cars.

Road transport is lagging behind the necessary reductions in greenhouse gas emissions. While total emissions in the Netherlands fell by 23% between 1990 and 2019, emissions from road transport increased by 9% (Dutch statistics). Additional measures are needed to meet the climate targets for mobility (IBO Klimaat, 2023; KEV, 2024). The political left wants to reduce car mobility through better and cheaper public transport (D66, 2023; GL-PvdA, 2023; Greenpeace, 2023; PvdD, 2023). Public transport companies also promote themselves as the green alternative to the car. And the government expects better public transport to be good for the environment (I&W, 2023).

In fact, public transport is cleaner than the car. For every kilometre travelled, the car emits sixty times more greenhouse gases per person than the train, and the damage to the environment and health is four times greater (Schroten et al., 2022). So it seems logical to give public transport a prominent place in the fight against car pollution. But does better and cheaper public transport really lead to less car traffic and pollution?

No communicating vessels

On average, the Dutch choose the car eight times more often than public transport (Dutch statistics). This is mainly because the car is usually much faster from door to door. If public transport and the car take the same amount of time for a journey, about half of the people will choose public transport and the other half will choose the car. But this is rarely the case. Only 12 per cent of all car journeys take less than twice as long. When twice as long, only 15 per cent choose public transport. If the journey takes three times as long, hardly anyone takes the train or bus (Bakker et al., 2015; van den Heuvel, 1997).

Thus, the longer travel time with public transport largely explains why people mostly use the car. The call to take PT instead of the car therefore requires people to accept a longer travel time, to choose another destination that is more accessible by PT, or to travel less far. Public transport is therefore clearly not an alternative for most car journeys.

An often-heard objection is that there has been too little investment in PT in recent decades and that it cannot therefore compete with the car. However, a meta-study shows that better PT - faster and cheaper - attracts more travellers, but only ten to twenty per cent of these come from the car (Haas et al., 2022). The other eighty to ninety per cent travel further than before or used to go by bike. This study was conducted in response to the popularity of the German 'climate ticket'. In the summer of 2022, people there could travel for free in all regional public transport for nine euros a month. As a result, the use of public transport rose sharply.

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² Independent consultant and president of the board of Transport & Environment. mail@ariebleijenberg.nl.



In the Netherlands, the public transport user's organisation Rover (2024) and left-wing political parties are advocating similar measures. An estimate based on (cross) elasticities shows that if faster and cheaper public transport were to attract 50 per cent more travellers, car use would fall by only 1.3 per cent (RWS, 2024; Terwindt et al., 2024).

Conversely, if car use is reduced, only about five per cent of car users switch to public transport (RWS, 2024; Terwindt et al., 2024). Drivers will mainly choose destinations closer to home. Think, for example, of the local supermarket rather than the more distant XL supermarket. An international study of one hundred road closures or narrowings shows that if there is already congestion on nearby roads, about a quarter of the mobility on that route 'evaporates' (Cairns et al., 1988). In fact, many people choose shorter trips rather than using public transport. Dutch research into the mobility effects of major maintenance work on the Amsterdam ring road found that five per cent of the 'disappeared' car users switched to PT (Taale et al., 2002).

So car use and public transport are hardly communicating vessels. Not even historically. Between 1960 and 1990, car mobility per inhabitant in the Netherlands grew sevenfold, but not at the expense of PT use, which also increased somewhat during this period (Dutch statistics). The speed and flexibility of the car meant longer journeys and thus more mobility.

Proximity

Investing in better public transport is therefore not an effective way of reducing car use. However, the spatial concentration of homes, businesses and facilities in towns and cities reduces car use. We see that cities are more accessible than rural areas, despite the fact that car mobility per person is 47% lower in cities (Dutch statistics). This good accessibility in cities is due to the fact that the average travel distance is 29 per cent shorter than for people in non-urban areas of the Netherlands, as facilities and jobs are close by (Bastiaanssen and Breedijk, 2022, 2024; Bleijenberg, 2021).

Urban densification is therefore the cheapest way to improve accessibility while reducing car traffic, as also concluded by the six-year academic research programme Sustainable Accessibility of the Randstad (Bleijenberg, 2015). A comparison of European and US cities shows the same: European cities have on average three times higher density, half as many car travel per inhabitant and better accessibility (Cornwell, 2023).

If the nearly one million new homes needed to address the housing shortage (Tweede Kamer, 2023) are all built in existing cities, there will be about three per cent less automobility than if they were dispersed. This is because per capita car use in highly urbanised communities is lower than the national average (Dutch statistics).

In small villages, basic facilities should be maintained or re-established to reduce car dependency. These include a GP, school, supermarket, bus stop, library and café. In order to maintain an economic basis for these facilities, a spatial concentration of homes and businesses is also needed in villages.

Less space for cars

A second effective way of influencing car use is to give the car more or less space. For decades, many cities have reduced the space available for cars by zoning pedestrian areas, reducing on-street parking and reducing road capacity in favour of attractive public spaces, cycle lanes and free bus lanes. The scarcity of space in the city drives these choices, with the car at a disadvantage as it requires 10 to 20 times more space per passenger-kilometre than public transport or cycling. Since the turn of the century, the car mobility of the 20% of the Dutch population living in large cities has fallen by about a quarter (Dutch statistics).

Not only within cities, but also outside them, the space available for cars has a direct impact on car use. A one per cent increase in motorway capacity leads in urban regions to one per cent more traffic (Ossokina et al., 2023; Volker et al., 2020). Using this rule of thumb, between 2005 and 2019, motorway widenings in the Netherlands led to seven per cent growth in car traffic (Bleijenberg, 2023). This accounts for more than half of the growth in car mobility in the Netherlands over this period. The other half is due to population growth. If the main road network is not extended further, the Netherlands will have about three percent less car traffic in 2030 than with the planned extensions.

Congestion regulates mobility behaviour. Excessively long traffic jams encourage drivers to choose a shorter journey, to avoid the rush hour, to travel with someone else or to use another mode of transport. Less congestion has the opposite effect (RWS, 1992). The Dutch elasticities mentioned above indicate that a 1 per cent increase in the average speed of cars during the rush hour leads to 1.1 per cent more commuter traffic on the roads (Terwindt et al., 2024; Rijkswaterstaat, 2024). Expanding motorway capacity generates additional mobility, but not better accessibility, as it encourages further suburbanisation and spatial dispersion. This is contrary to the spatial concentration desired for accessibility.

Public transport is economically and socially important

While public transport can do little to reduce pollution from cars, there are other reasons for maintaining good public transport. After all, an economically strong urban region depends on high-quality public transport for its accessibility (Bleijenberg, 2017, 2021). And it is the major metropolitan areas that are the engines of our economy (Goldin and Lee-Devlin, 2023; Glaeser, 2021; CPB and PBL, 2015). A few figures to illustrate the importance of good PT for accessibility. Of travellers from Utrecht to Amsterdam, 69 per cent arrive by public transport. And from Haarlem, Rotterdam and The Hague, more than half come by train, almost twice as many as by car (Amsterdam, 2021). Amsterdam's public transport company GVB carries almost as many people as the Dutch railway company NS every day. And the north-south metro line in Amsterdam carries more passengers than people board trains at the stations on the Zwolle-Groningen line. Large cities have to contend with scarce space, leaving less room for cars. However, the development of space-efficient urban rail - tram, metro, commuter train - has not been a priority in the Netherlands. We have missed this turn, unlike Germany, for example, with its U-Bahn and S-Bahn (de Boer and Witte, 2024). Adjustments can still be made, for example by extending the north-south line from Amsterdam to Schiphol airport and Hoofddorp. This will do more for accessibility and economy than the planned Lelylijn between Zwolle and Groningen.

A second reason for investing in public transport is that it provides transport options for people who cannot or do not want to drive a car. More than six million Dutch people do not have a driving licence and about a quarter of Dutch households, especially those on low incomes, do not own a car (Dutch statistics). They are therefore dependent on public transport. PT services need to provide this better, for example by providing bus services between neighbourhoods with average low incomes and companies where many people with practical jobs work. These buses should also run during shift changes.

The spatial concentration advocated in this article gives PT the wind in its sails. The construction of the one million new homes in 'very highly urbanised' municipalities will increase the use of public transport nationwide by about six per cent compared to dispersed building. This estimate is based on the difference in per capita use of PT between highly urbanised municipalities and the rest of the Netherlands. In addition, measures to reduce urban space for cars are usually part of a policy package that also includes improved public transport and cycling facilities (ITF, 2021; Kuss and Nicholas, 2022).

Conclusion

Additional policy measures are needed to achieve the climate targets for road transport. Car use can be reduced by spatially concentrating new housing (about three per cent), stopping the construction and widening of motorways (about three per cent), redesigning cities to make them attractive and healthy places to live (one or a few per cent nationally), and by improved and cheaper public transport (one to two per cent). Less car traffic will come not so much from a shift to public transport, but mainly from shorter journeys and thus less mobility. However, better accessibility in cities goes hand in hand with less mobility.

Public transport should no longer try to attract as many travellers as possible as a supposed alternative to the car. The economic and social arguments for good public transport make more sense than the grey-tongued record that public transport is cleaner than the car. A change in public transport policy is needed.

However, the biggest environmental gains can be made by switching to electric cars: sixty to seventy percent less greenhouse gases (Milieucentraal, 2024; Transport & Environment, 2024). This includes the emissions released during the production of the car, including the batteries.

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