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Cycling to Sustainability in Amsterdam¹

By Ralph Buehler, Assistant Professor, Virginia Tech and John Pucher, Professor, Rutgers University

Introduction: The many dimensions of cycling's sustainability

There are many good reasons to encourage more cycling. It causes virtually no noise or air pollution and consumes far less non-renewable resources than any motorized transport mode. The only energy cycling requires is provided directly by the traveler, and the very use of that energy offers valuable cardiovascular exercise. Cycling requires only a small fraction of the space needed for the use and parking of cars. Moreover, cycling is economical, costing far less than both the private car and public transport, both in direct user costs and public infrastructure costs. Because it is affordable by virtually everyone, cycling is among the most equitable of all transport modes. In short, it is hard to beat cycling when it comes to environmental, social and economic sustainability.

This article examines how Amsterdam has consistently improved cycling conditions over many decades and succeeded at raising even further the share of trips by bike. As a result, it has become one of Europe's most sustainable cities, offering convenient, safe, and socially acceptable alternatives to car dependence. Unlike cities in North America, all segments of society cycle in the Netherlands: women as much as men, all age groups, and all income groups. The universality of cycling in the Netherlands highlights the extraordinary degree of social sustainability that bicycling makes possible.

Amsterdam: Cycling Capital of Europe

Bikes have shaped the image of Amsterdam to such an extent that, for many people throughout the world, Amsterdam is almost synonymous with cycling. In 2008, cycling accounted for 38% of all vehicle trips—a bike mode share unheard of in other European cities of comparable size (City of Amsterdam, 2009).

With a population of 743,000, Amsterdam is the largest city in the Netherlands. The greater Amsterdam region has 1.5 million inhabitants and is situated at the northern end of the Randstad, the Netherlands' largest urban agglomeration.

Amsterdam's city administration estimates that there were 600,000 bikes in Amsterdam in 2006, about 0.75 bikes per inhabitant (City of Amsterdam, 2007). Amsterdam's topography and spatial development patterns are ideal for cycling. The city is mostly flat and densely built-up. Mixed use neighborhoods keep

trip distances relatively short. Furthermore, many small bike bridges and bike short cuts make it easy to navigate the city center by bike. By comparison, car use is difficult in the central city. There are few car parking spaces, and many cul-de-sacs and one way streets hinder car travel.

Given high bike ownership levels, restrictive policies on car use, compact and mixed-use development patterns, it is no wonder that in 2003 fifty percent of Amsterdam's inhabitants made daily use of their bikes (City of Amsterdam, 2003a). Over 85% of Amsterdam's residents rode their bikes at least once a week in 2003. Bicycling is almost universal in Amsterdam. The rich and the poor, men and women, children and the elderly, all use the bicycle for a minimum of 20% of their trips (City of Amsterdam, 2003b). Two noteworthy variations in bike use exist, however. First, the affluent cycle more than the poor in Amsterdam. Higher car ownership levels in affluent households lead one to expect more car use in this income group compared to poorer households. Bike planners in Amsterdam speculate that lower income groups see the car as an important status symbol, while they view the bicycle as a "poor man's" vehicle. Consequently, they prefer to drive instead of cycle. Bike planners argue that richer households find the bicycle to be a fast, healthy and convenient means of transportation without a stigma attached to it.



Everybody cycles in Amsterdam. Children ride both in front and behind, and no one wears a helmet.

PHOTO BY JOHN PUCHER



Over half of all bike trips in Amsterdam are by women.

PHOTO BY JOHN PUCHER

Secondly, recent immigrants and their children also cycle less than the average resident of Amsterdam (Dutch Bicycling Council, 2006). Amsterdam's bike planners found that cycling is often not part of the original culture of immigrants. Therefore cycling is not their transport mode of choice in the Netherlands either. The city council tries to promote bike use through special programs for immigrants and their children.

Travel trends

Amsterdam has a long tradition of cycling. In 1955, up to 75% of all trips in Amsterdam were made by bicycle. From 1955 to 1970 the cycling mode share had declined to only 25% of all trips (Dutch Bicycling Council, 2006; Langenberg, 2000). Declining levels of cycling were accompanied by increasing suburbanization and growing car ownership and use. However, most other European cities of comparable size would be proud of a bike mode share of 25%.

Since the late 1960s and early 1970s, bicycle advocates and environmentalists have promoted bicycle use in the city. Their main concerns were air and noise pollution, traffic congestion, and unsafe traffic conditions caused by automobile use in the city. At the time, there were two competing solutions to Amsterdam's traffic problems: adapting the development patterns and city structure to the automobile or limiting car access to the city center and promoting walking, cycling, and public transportation. The city council chose to promote alternative modes of transport over widening roads and building car parking garages in the city center.

Finally, in 1978, a newly elected city council focused on bicycling as an integral tool for solving the city's transport problems. Since the early 1970s, bicycle use has been increasing. Bike mode share reached 31% of all vehicle trips in the mid-1980s, and rose further to 37% in 2005 and 38% in 2008 (City of Amsterdam, 2007 and 2009). Over the same period of time, the mode share for public transport declined slightly (from 27% in 1985 to 25% in 2008). The percentage of trips made by car declined from 42% in 1985 to 37% in 2008 (Dutch Bicycling Council, 2006; City of Amsterdam, 2007 and 2009). Bicycling in Amsterdam is used for all trip purposes: for 34% of work trips, 33% of shopping trips and 27% of leisure trips in 2003.

In 2000, over half (55%) of all vehicle trips in the historic city center were by bike. Cordon counts at important intersections in the city center support this number. They also reveal an increase of up to 20% in the number of bike trips from 1986 to 2000 (City of Amsterdam, 2003b).

As in most other cities, bicycling levels decline with distance to the city center. In 2000, 40% of trips were made by bike in inner ring city districts; and 21% of all trips were by bike in more suburban districts built after World War II. From 1986 to 2000 bicycling levels decreased by around 10% in these outlying areas.

Overall policy goals

Non-motorized modes of transport are at the center of Amsterdam's transport policy. Even though the city's main transport policy goal is to increase accessibility by all modes, concerns about quality of life and air pollution give the bicycle a special role in transportation planning. In 2006, the main areas of concern for cyclists were bicycle theft, shortage of safe bike parking facilities, traffic safety, and relatively long waiting times at signalized intersections.

Following its bicycle policy plan "Choosing for Cyclist: 2007-2010," the city has started to try to address these problems by increasing bike parking facilities, combating bicycle theft, improving and promoting traffic safety, completing and improving the bike network and getting young people to bike more (City of Amsterdam, 2007). From 2007 to 2010, about €40 million of city funds will be spent on bicycling projects, not including addi-



Bike access to "Big Box Retail" in the Netherlands.

PHOTO BY PETER BERKELEY



tional measures to increase traffic safety. Together with matching funds from other levels of government, the total amount of funding for bicycling will increase to €70 million over 4 years. This comes to about €13 per inhabitant per year, which is comparable with other Dutch cycling cities. About €12 million is set aside to improve bike parking facilities and guarded bicycle garages. Furthermore, traffic calmed areas (with a speed limit of 30km/h) are to be expanded. Amsterdam will invest €500,000 for bike education, public relations campaigns and other activities designed to increase bicycling among young people and other groups of society that tend to cycle less often (City of Amsterdam, 2007). The city also wants to replace on-road bike lanes with separate bike paths.

The city is making efforts to integrate bike and transport planning across all city districts and across many departments of the city administration. For example, efforts are being made to integrate transport and spatial development plans. The main responsibility for carrying out bicycle projects lies with the city districts. This results in slight differences in implementation of bike projects and bike infrastructure among the different areas of the city. The traffic and transport infrastructure department (DIVV) tries to coordinate and harmonize all bicycling efforts city-wide.

Amsterdam recently launched a comprehensive program to combat bike theft. In 2006, about 50,000 bikes were stolen in Amsterdam (almost 10% of all bikes!). That might seem like a lot, but it is in fact a 37.5% decrease compared to 2001 and can be considered a first success in combating bike theft. Amsterdam's bike policy postulates the goal to further reduce bike theft to 6% of all bikes by 2010 (City of Amsterdam, 2007).

To help to achieve this goal, the city has a comprehensive approach consisting of official bike registration, collaboration with bike stores, and strict police checks for bike ownership. Amsterdam has invested €5 million since 2002 and plans to invest €4 million



Cycling at the intersection of two bikeways in front of the Rijks museum.

PHOTO BY JOHN PUCHER

Safety

As in most Dutch cities, traffic safety increased for cyclists over the last few decades. In 2005, there were 40% fewer severe cyclist injuries and deaths from traffic accidents than during the mid-1980s. Even though progress has been made, between 6 and 7 cyclists are still killed in traffic accidents in Amsterdam every year. Bicycle safety is important in the Netherlands. It does not revolve around bicycle helmets, however. In the Netherlands, bicycle helmets are seen as unattractive and therefore potentially discouraging to cycling. Additionally, bike planners argue that bike helmets might lead cyclists to behave more dangerously, as they feel less vulnerable. Finally, bike planners point out that car drivers use less care when interacting with cyclists wearing helmets.

Dutch traffic laws protect young cyclists and put the responsibility for an accident on the car driver. The only exception is when cyclists deliberately and flagrantly disobey traffic laws. Similar to Germany, Dutch traffic laws postulate that car drivers have to take special care when encountering children and the elderly.



Two-way bike path in the middle of a car-free zone in Amsterdam.

PHOTO BY LEWIS DIJKSTRA



Special Traffic signals give cyclists priority and display seconds till green light.

PHOTO BY LEWIS DIJKSTRA



Typical traffic-calmed neighborhood in Amsterdam, with restricted car access and speeds limited to 30km/h.

PHOTO BY JOHN PUCHER

Provision of cycling facilities

In 2007, the city of Amsterdam had a total of 450km of bike paths and lanes. In contrast to cities like Copenhagen, where bike paths and lanes have a long history, most paths and lanes in Amsterdam have been built since the early 1980s. In 2007, the city's bike infrastructure was made up of 200km separate bike paths throughout the city and 200km of bike lanes along 30 km/h traffic calmed neighborhood streets. There were 50km of bike paths along roads with speed limits of 50 km/h. In addition, Amsterdam had about 775 km of traffic calmed streets in 2000. Over the coming years, the city plans to expand the main bicycle network by about 40 – 50 km of paths and lanes and to add another 175 km of traffic calmed streets.

Most of the proposed investments for bicycling discussed above will go towards cycling infrastructure. The majority of funds (€24 million) will be used for three crucial bridges and tunnels connecting the main bike network ('Hoofdnet Fiets').

Building separate bicycle paths to connect the bike network will cost an additional €18 million. Funding for bike infrastructure comes from district, city and regional budgets (City of Amsterdam, 2007).

Restrictions on cars

The city of Amsterdam has greatly restricted car access to the city center. Many streets are one way for cars, and others are solely reserved for pedestrians and cyclists, and are completely off-limits to automobiles. Since the 1970s, the city has reduced the amount of car parking in the city center. Additionally, fees for the remaining car parking spaces were substantially increased since the 1970s (Langenberg, 2000; Dutch Bicycling Council, 2006). In 1992, citizens voted to continue to decrease car parking in the city center. This has proven to be an effective transportation demand management tool. When parking is sparse and costly, it discourages car trips to the city. Furthermore, as in most Dutch cities, many residential areas are traffic calmed at a low speed for cars (30 km/h areas).

Bike Parking and Coordination with public transport

Amsterdam has large bike parking facilities at its train stations. During peak hours on workdays, up to 10,000 bikes were parked at Amsterdam Central Station in 2006. Unfortunately, the number of unguarded bike parking facilities has declined sharply in recent years due to massive reconstruction around the Central Station. The reconstruction is proposed to last until 2012. The city is trying to accommodate bike parking needs with a temporary three story bike parking garage. Demand for parking outnumbers the available 2,500 parking spots, however. City planners estimate that about 4,000 bikes are parked in this parking garage. This is accomplished by double parking bikes in parking spots originally designed for single bikes. Even though this parking garage is overcrowded, it is still not enough to accommodate all bicycles.

As a result, bikes are parked all around the train station. The City of Amsterdam installed an additional 1,000 bicycle racks around the station and provided another 1,500 bike parking places on an old ferry –anchored on an adjacent river—until construction of the train station is completed. After reconstruction is complete in 2012, there will be 10,000 bike parking spaces in sheltered facilities at the train station.

Amsterdam has pioneered an innovative integration of automobile and bike use. This program is called "Park and Bike," which allows motorists to park their cars at the fringe of the city and to complete their trip to the city center on bike (Dutch Bicycling Council, 2006). The main reason for implementing this program was the lack of car parking in the downtown area and a shortage of transit access to all parts of the city. The bike rental



fee is included in the price of the car parking ticket. In 2006, Amsterdam had 80 of these rental bikes at two locations (Olympic Stadium and Sloterdijk station). During summers, the city reports that 60% of all rental bikes are in use every day. The program is not working at a profit, thus municipal governments in the region cover excess costs not met by parking fees.

Bicycling promotion

Similar to Germany, Dutch school children go through bicycle training in school. This further familiarizes children with bicycling and teaches necessary traffic rules and behavior. Bicycles are made available to schools by the city government for free so that children who do not own a bicycle can learn at school how to cycle safely in Amsterdam. In the Netherlands, many children experience bicycling early in life; they learn to cycle when they are 3-4 years old. Many infants make their first bike ride on the backseat or in special bike trailers with their parents. Children of immigrants often do not have these early experiences of bicycling, as cycling is not part of the culture of their country of origin. Indeed, the city reports that children of recent immigrants cycle less than the average child in Amsterdam. Therefore, the city plans to make special efforts to target children of recent immigrants through bicycling promotion and to make bicycling as appealing and as irresistible as possible to them.

Learning from Amsterdam

Many countries around the world have set themselves the goal of increasing the sustainability of their transport systems. They would do well to look to the Netherlands and Amsterdam for effective strategies to restrict car use and promote the use of alternative modes that are more environmentally friendly as well as more economical and socially equitable. It is hard to beat cycling in terms of sustainability, and Amsterdam provides an excellent example of how a city can become more livable and most sustainable by designing its transport system around the bike.

John Pucher (pucher@rutgers.edu) is professor of planning and public policy at Rutgers University in New Brunswick, New Jersey. He specializes in comparative research on transport systems, travel behavior, and public policies in the United States, Canada, and Europe. Over the past twelve years, Pucher's research has focused on walking and cycling and how public policies could be improved to encourage these most sustainable of all modes of transport. Currently, Pucher is principal investigator of a research project for the US Department of Transportation examining bicycling trends and policies in large American cities.

Ralph Buehler (ralphbu@vt.edu) is an Assistant Professor in the Urban Affairs and Planning Program at Virginia Tech's Alexandria Center. His research seeks to determine what countries can learn from each other to improve the sustainability of

their urban transportation systems. Together with Pucher, he is co-principal investigator of a research project for the US Department of Transportation examining bicycling trends and policies in large American cities. His dissertation "Transport Policies, Travel Behavior, and Sustainability: A Comparison of Germany and the U.S." was honored with the "Barclay Gibbs Jones Award for Best Dissertation in Planning 2008" by the Association of Collegiate Schools of Planning.

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Endnotes

- 1 Information on cycling in Amsterdam was collected directly from Dutch transport planners and cycling experts. The main bicycling planner for Amsterdam, Ria Hilshorst, provided extensive information, corrections, and valuable feedback on this case study of cycling in Amsterdam. Information was also collected from the following published sources: City of Amsterdam (2003a; 2003b; 2007); Dutch Bicycling Council (2006); Langenberg (2000); and Osberg et al. (1998).