The e-bike:
user groups and effects on travel behaviour

With the emergence of e-bikes, people can now cycle longer distances with relatively less effort, as compared to regular bicycles. Although senior citizens were the first to fully embrace e-bikes, using them primarily for leisure purposes, e-bike use has shifted in recent years. The Netherlands Institute for Transport Policy Analysis (KiM) studied the existing e-bike user groups and determined how e-bikes impact travel behaviour. Do people use cars less frequently, for instance, or do e-bikes primarily replace regular bicycles?
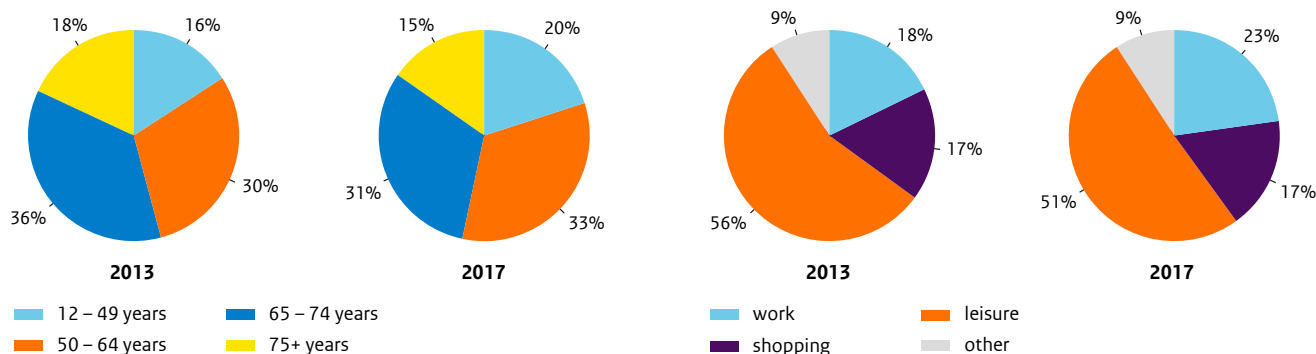
Growth of e-bike use

Sales of new e-bikes have increased in recent years. In 2018, for the first time ever more e-bikes were sold than standard city bicycles. Concurrently, e-bike usage rates have increased sharply. In 2013, Dutch people used e-bikes 257 million times; in 2017, they used e-bikes approximately 442 million times. Moreover, in 2017, e-bikes accounted for 18% of the total distance cycled in the Netherlands. An e-bike user travels an average of 5.1 kilometers per trip, while that figure is 3.5 kilometers for a regular bicycle. In addition to increased e-bike use, different types of people are now using e-bikes (see Figure 1): not only is the share of users aged 65+ decreasing, but e-bikes account for an increasingly larger share of work-related trips.

Research objective

Given such growing popularity and changing usage patterns, e-bikes are becoming an increasingly important means of transport in Dutch people's daily mobility. However, little is known about current e-bike users. Moreover, insight into how e-bikes impact travel behaviour is lacking, as most research studies are not specifically focused on the situation in the Netherlands. Drawing on data from the Netherlands Travel Survey (OViN) and the Netherlands Mobility Panel (MPN), KiM studied the various e-bike user groups and determined how e-bikes impact the use of other transport modes.

Figure 1   Distribution of the distance traveled by e-bike by age (left) and trip purpose (right)

2013 2017 2013 2017

Age legend:
- 12 – 49 years
- 50 – 64 years
- 65 – 74 years
- 75+ years

Trip purpose legend:
- work
- shopping
- leisure
- other

Five different user groups

From the OViN data, five different e-bike user groups emerged[1]. These groups are named according to the dominant characteristic of the people belonging to the particular group[2]. A brief explanation is given for each group, in descending order of size.

Group 1: Retired older leisure users
This, the first and largest user group (53%), is comprised of the traditional e-bike users, with virtually everyone in this group aged 65+. This group's average age is 72 years old. Consequently, nearly everyone in this group is retired. This user group primarily uses e-bikes for leisure or shopping purposes.

Group 2: Middle-aged full-time working people
Approximately 20% of all e-bike owners belong to this second user group: these users are significantly younger than those in Group 1, with an average age of around 53 years old. Most of the people in this group have full-time jobs (78%), which is also reflected in the fact that this group uses e-bikes for a relatively high share of work-related trips.

Group 3: Older female leisure users
This third group – comprising 14% of all e-bike owners – consists primarily of women aged between 50 and 65 years old. This group is nearly equally comprised of people with part-time jobs and people who are primarily homemakers. Like Group 1, this group mainly uses e-bikes for leisure or shopping purposes.

Group 4: Younger part-time working women with children
The fourth group – 11% of e-bike owners – is largely comprised of women. With an average age of 46 years old, this group is relatively young compared to the previous groups, with most of the people in this group having part-time jobs. Notably, some 80% of the people in this group reside in households consisting of two adults (partners) with children. This group uses e-bikes for work-related trips, as well as for leisure and shopping purposes.

Group 5: Students
The final and smallest group, comprising only 1% of e-bike owners, largely consists of teenagers: 94% of this group is aged 12 to 20 years old. Given this group's young average age, the group includes a high proportion of lower educated people. Moreover, 90% of the people in this group are high school or college students, which is also reflected in the fact that people in this group frequently use e-bikes for education-related purposes.

Table 1   Characteristics of the five different user groups

	Group 1	Group 2	Group 3	Group 4	Group 5
⚥	Men and women	More men	Women	Women	Men and women
👥	72 years old	53 years old	59 years old	46 years old	16 years old
🎓	Low educated	Middle/high educated	Low/middle educated	Middle/high educated	Low educated
💼	Retirees	Full-time workers	Part-time workers/homemakers	Part-time workers	Students
👫	Couple without children	Couple with/withour children	Couple without children	Couple with children	Couple with children
🚲	Shopping/leisure	Work	Shopping/leisure	Work, shopping and leisure	Education

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[1]   As of 2013, the OViN, the Netherlands' National Travel Survey, asked participants aged 12 and older if they owned e-bikes.

[2]   People who have certain characteristics that deviate from the title of the group can still belong to the group in question. Hence, it can transpire that the name of the group refers to women, but that a certain percentage of men belong to the group.

Table 2   Development e-bike user groups, share and total size

Share	Group 1	Group 2	Group 3	Group 4	Group 5	Total
2013	56.1%	17.9%	15.4%	9.2%	1.3%	1,170,000
2014	53.8%	19.8%	14.5%	10.5%	1.3%	1,369,000
2015	49.5%	22.9%	15.4%	10.7%	1.5%	1,630,000
2016	49.8%	24.5%	12.6%	11.4%	1.7%	1,832,000
2017	48.6%	23.6%	12.3%	13.6%	1.9%	2,033,000
Absolute size						
2013	657,000	209,000	180,000	108,000	16,000	1,170,000
2014	737,000	272,000	199,000	144,000	18,000	1,369,000
2015	807,000	374,000	250,000	175,000	24,000	1,630,000
2016	912,000	449,000	230,000	209,000	32,000	1,832,000
2017	988,000	480,000	250,000	276,000	39,000	2,033,000
Growth 2013-2017						
Growth (%)	50%	129%	39%	156%	150%	74%

Development of user groups

It is logical that the increased e-bike sales are reflected in the development of the various user groups. E-bike ownership increased by some 74% from 2013 to 2017. However, clear differences in the various groups' growth rates emerged, as detailed in Table 1 and Figure 2. As previously noted, e-bike use has shifted, marked by a decrease in older users. Group 1 and Group 3 – the groups comprising the most senior citizens – experienced slower growth than other groups; for example, Group 1, the retired older leisure users, grew by 50%; however, as this group's growth rate was lower than the total growth rate, Group 1's share decreased from 56% to 49% from 2013 to 2017.

Rapid growth among younger user groups

The second, fourth and fifth user groups more than doubled in size over the past five years. Relatively speaking, the fastest growing group is that of the younger, part-time working women with children (Group 4), followed by the students (Group 5), which also helps explain the e-bike's increasing share of work-related trips. Group 2 and Group 4 are the groups that primarily use e-bikes for work-related trips, and less frequently for leisure and shopping purposes.

E-bikes not yet popular among everyone

Identifying the various e-bike user groups not only revealed who e-bikes are popular with, but also those who are not yet using e-bikes. Notably, for example, the various user groups rarely included 20 to 40 year olds; for example, in Group 2, comprised mainly of people with full-time jobs, only 10% of users are aged between 20 and 40 years old. Group 4 meanwhile has the most users aged 20 to 40: 29% of those in this group are aged between 20 and 40 years old, and the majority of users have part-time jobs. This study cannot reach conclusions as to why e-bikes remain unpopular among certain groups.

E-bikes impact on travel behaviour

The development of the user groups reveals that the fastest growing groups mainly use e-bikes for work-related trips, although this gives no indication of how e-bikes impact the use of other transport modes. Data drawn from the Netherlands Mobility Panel (MPN) does however provide insights into the e-bikes' impact. Because the MPN records people's travel behaviour over extended periods of time, it is possible to observe the extent to which transport mode use changed as a result of purchasing and using e-bikes.

Figure 2   Growth of e-bike user groups compared to 2013
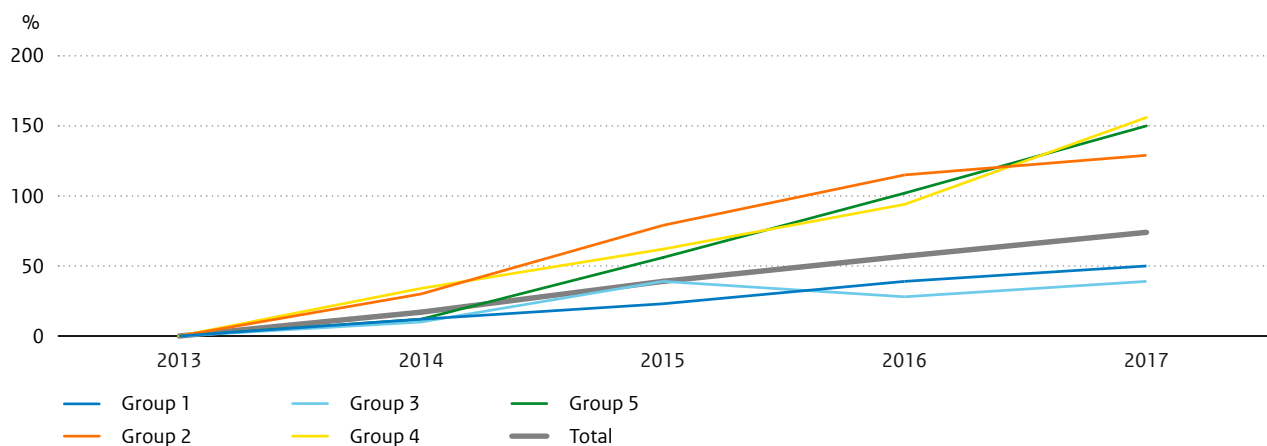
More cycling after purchasing e-bikes

Analysis revealed that after purchasing e-bikes people especially travelled less via regular bicycles or by foot. Additionally, the increase in e-bike use is greater than the decrease in regular bicycle use. After purchasing e-bikes, people cycle more frequently and for longer distances. No evidence exists however to suggest that after purchasing e-bikes people make more trips or travel longer distances in total.

E-bikes primarily replace regular bicycles

After purchasing e-bikes, people cycle more and for longer distances, but to what extent does e-bike use result in people using other transport modes differently? This can be determined by analysing people's travel behaviour in different years. If all trips are examined – hence no distinctions made for the reasons why people use e-bikes – e-bikes are found to only replace regular bicycles. And the same determination is made when specifically examining leisure or shopping trips.

Decrease in car use for commuting

When specifically examining commuting trips, e-bikes replace both regular bicycles and cars; hence, increased e-bike use leads to a decrease in car use for commuting. Because it is precisely the user groups that use e-bikes for commuting that are growing fast, a definitive change in how people commute to work is likely to emerge in the coming years.

Follow-up research

This research is limited in the sense that the reasons why people purchase e-bikes remains unknown. It could well be that purchasing an e-bike engendered a change in travel behaviour, yet it could also be the case that the person wanted to change something about their travel behaviour and thus purchased an e-bike. This study revealed that after purchasing e-bikes people use cars less for commuting; it could be that they purchased e-bikes because they wanted to commute to work less by car, or, conversely, after purchasing e-bikes they discovered that e-bikes were also suitable for commuting and, consequently, reduced their car use. Understanding these underlying reasons is key to determining whether encouraging people to purchase e-bikes will impact car use.