



# Electric vehicles

## What are the effects on road safety?

**The use of electric vehicles is still in its infancy in the Netherlands. Their numbers, however, are growing. Reason for SWOV to carry out an exploratory study into the consequences of the use of electric vehicles for road safety. Most of the attention went to the effects of noiseless passenger cars and scooters.**

### Environment

Environmental considerations encourage national and municipal governments to stimulate the purchase and use of electric vehicles. In 2010, hybrid passenger cars made up 0.5% of the entire Dutch vehicle fleet; the fully electric passenger car has not yet really begun its advance. The other electrically driven vehicles on the Dutch roads are some busses, trucks, delivery vans and motorcycles. Especially for urban distribution, electric delivery vans are expected to replace conventional delivery vans. At the same time, the use of electric scooters is already growing considerably.

### Approach

The SWOV research started with a literature study. Only research from other countries than the Netherlands were found which dealt with the road safety aspects of electric pas-

senger cars; no literature was found about the road safety aspects of electric scooters. This prompted SWOV to carry out an exploratory study. Therefore, employees in this branch were interviewed and an internet survey was held. Furthermore, organizations for the visually handicapped were contacted and were asked about their experiences with noiseless motor vehicles.

### Sound and speed

The engine of an electronically driven passenger car is almost noiseless at low speeds: international research indicates that these cars produce hardly any sound at speeds of up to about 20 km/h. At faster speeds the sound of the tire on the road surface is most prominent, although the noticeability is very much determined by the type of road surface and the city sounds.

### Cyclists and pedestrians

Hazardous traffic situations for cyclists and pedestrians occur especially when crossing the road and at parking sites. Although American research indicates that on roads with a low speed limit electric vehicles are involved in crashes with pedestrians more often than 'ordinary' cars, their exposition has not been corrected for. This, however, is necessary: if in urban areas electric cars drive twice as many kilometres as ordinary cars, a higher crash rate is already statistically explicable. In the Netherlands, the number of crashes with electric vehicles is too small at present to allow observations about the risks of crashes.

### Shock reactions

In an internet survey, users of electric cars and scooters report observing shock reactions among other road users. In addition, visually impaired and blind pedestrians worry about the growing number of silent cars. The noiselessness of electric scooters makes overtaking on bicycle tracks a point of special interest. Cyclists do not hear the electric scooter

approach. More than half of the scooter riders therefore adapts his traffic behaviour. Sellers of electric scooters say the maximum speed of light scooters is about 30 km/h, with some sellers admitting that it is easy to tune the electro-engine to a higher speed. The problems caused by electric scooters overtaking are comparable to problems caused by the overtaking by racing bicycles.

### Sound after all?

There are several developments that are concerned with providing electric vehicles with sound. The Japanese government has already drawn up an initial concept standard for the sound level of electric vehicles with a maximum speed of 20 km/h. Europe is also working on the development of acoustic warning systems and their possible standards. At present it is unclear whether it is necessary in the Netherlands to add artificial sound to passenger cars and other vehicles to prevent crashes with vulnerable road users. Statements on this issue require further research in the form of interviews and behaviour and conflict observations. The

results of these studies may also serve as a basis for a code of conduct for drivers of electric cars and electric scooters.

### Other aspects

Other safety aspects of electric cars, other than noiselessness, are the greater mass and the high on-board voltage. When a passenger car's combustion engine is converted into an electric engine, the greater mass will put an extra load on brakes, tires, steering, and suspension, and driving characteristics will be changed. For electric cars the high on-board voltage of 300-600 V could cause a short circuit. However, no evidence of this was found in the crash tests that have been carried out.

When the battery of an electric car is getting low, it can cause a speed difference with the other traffic. On rural roads this can lead to dangerous situations.

Finally, the salvage of a stranded car also plays a role.

### Recommendations

To acquire a better insight into the road safety

problems that are caused by electric vehicles, SWOV recommends further research in the form of interviews and behaviour and conflict observations in everyday traffic. In addition, it is desirable to monitor crashes involving electric vehicles and analyse the developments. Monitoring the changes in mobility due to the use of electric vehicles needs to be part of this to throw light on the crash rate.

Concerning electric scooters, the recommendations are in the first place aimed at the tuning up of the engine. The industry must be aware of the fact that the noiselessness of a tuned up electric scooter causes even greater problems on the bicycle path than a conventional tuned up scooter.

More about this study can be found in the following SWOV report:

[Traffic safety consequences of electrically powered vehicles.](#)

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