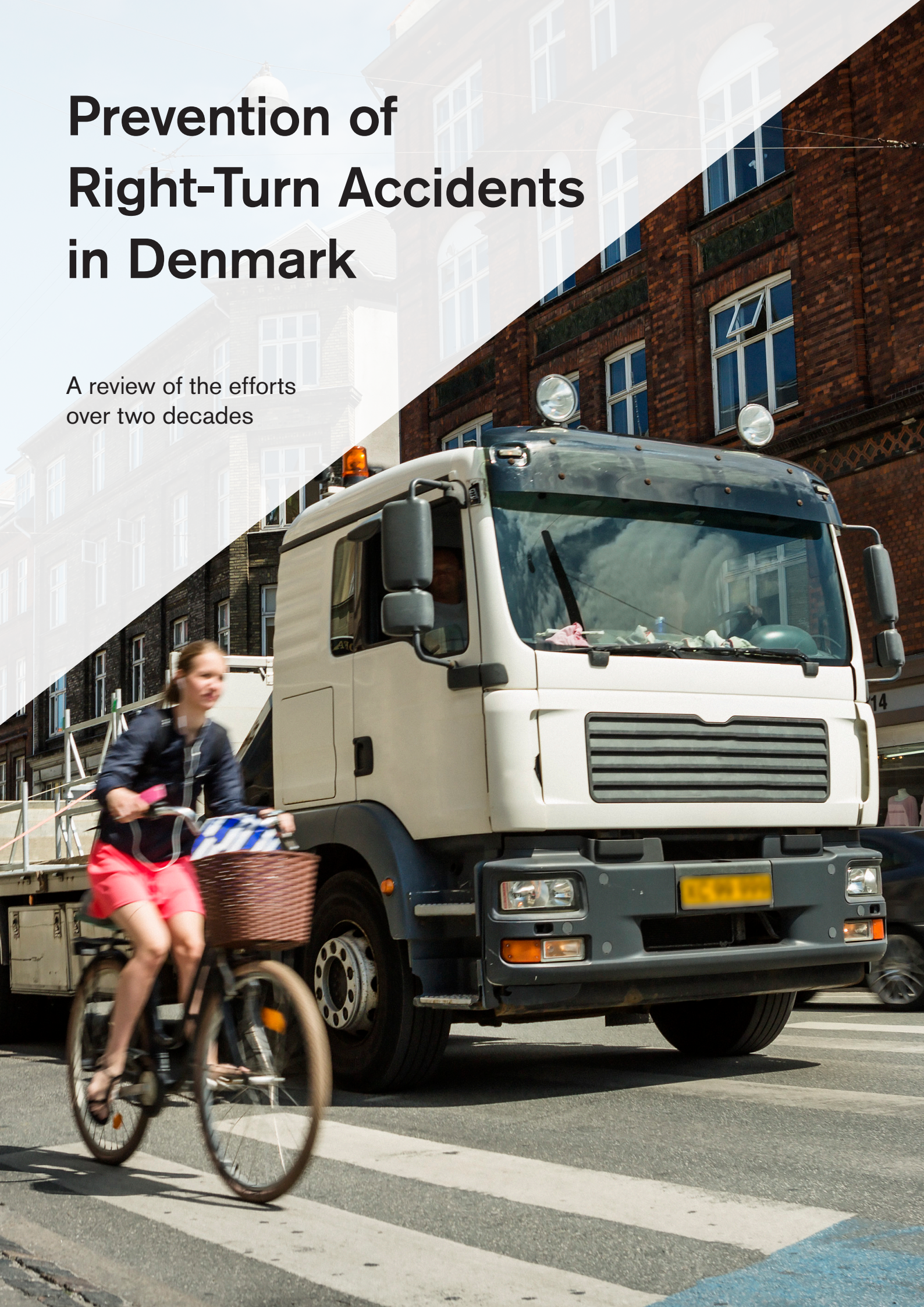


Prevention of Right-Turn Accidents in Denmark

A review of the efforts
over two decades



Title

Prevention of right-turn accidents in Denmark

Author:

The booklet has been prepared by the Danish Road Directorate in cooperation with The Right-turn Group and journalist Thomas Bjerg.

Front-page picture:

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Date:

August 2019

Printed by:

The Danish Road Directorate

ISBN (NET):

978-87-93674-47-9

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Preface

In Denmark, for a number of years there has been a focus on preventing accidents with right-turning lorries and cyclists going straight ahead. Both authorities, industry associations and the transport industry have contributed to the work, and it has provided a unique basis on which to reduce the serious right-turn accidents between cyclists and lorries.

For several years in the late 1990s, up to 40 cyclists per year were seriously injured or killed in right-turn accidents. This created an increased focus on this type of road accident.

In 2005, the efforts to fight right-turn accidents really sped up when The Danish Minister of Transport set up a new cooperation forum and at the same time asked the Danish Road Traffic Accident Investigation Board to make an in-depth analysis of right-turn accidents. This was to prevent the more serious accidents.

The cooperation forum was named the Spejlgruppen (The Mirror Group) – later Højresvingsgruppen (The Right-turn Group) – and their efforts resulted in noticeable results. The number of killed and injured cyclists has been more than halved since the late 1990s so that in 2017, 15 cyclists were seriously injured or killed in an accident with a truck turning right.

The group's broad composition has made it strong, because its members can look at new suggestions from many angles and interests. Therefore, it has also attracted attention abroad.

This booklet takes stock of many of the efforts made at both national and municipal levels, and it describes the experiences that the parties have made in the process. It also shows how the right-turn accidents affect all the involved parties and that both truck drivers and cyclists take the matter very seriously.

The booklet contains five themes. The first theme explains the historical background for intensifying the fight against right-turn accidents. Here, you can also find a timeline of the efforts. The following four themes show how the parties have collaborated in various areas, fighting against right-turn accidents. This concerns i.a.:

- Cooperation in The Right-turn Group
- Campaign efforts
- Transport industry involvement
- Road and infrastructure improvements

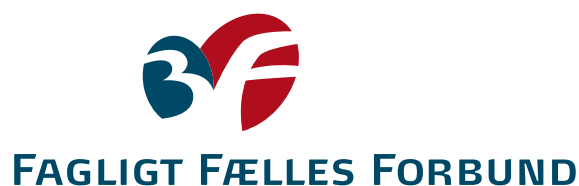
The Right-turn Group is still active and continues to work to inform and prevent right-turn accidents in Denmark. The group's next step will be to expand the focus area to all accidents between large vehicles and vulnerable road user such as cyclist, mopeds and pedestrians. However, the group continues to work under the name, The Right-turn Group.

On behalf of the Right-turn Group



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A historical overview: Focus on everything from lorry mirrors to human behaviour

The Danish efforts against right-turn accidents include improved vehicle technology, safer design of roads, in-depth analyses and studies as well as targeted police controls, campaigns and training of lorry drivers. A report and a broad cooperation forum really set the direction for the work that has looked at everything from mirrors to human behaviour.

The work to prevent right-turn accidents is based on a combination of in-depth knowledge in the form of analyses and studies as well as a long-term cooperation between authorities, organisations and companies. In particular, two events were crucial for the work of the past 13 years. In 2006, the Danish Road Traffic Accident Investigation Board (AIB) published the report “Accidents between Right-turning Lorries and Cyclists Going Straight ahead”. The work on the analysis began the year before, at the same time as the Danish Minister of Transport set up a cooperation forum which would be known as The Mirror Group, and later The Right-turn Group.

The Accident Investigation Board's (AIB) report offered 16 specific recommendations for preventing accidents, and The Right-turn Group decided to implement these recommendations. That set the course for the parties' work up until 2013 when new political awareness sparked a new collection of knowledge from abroad collected by an Inter-ministerial team as well as a new strategy for the prevention of accidents.

The report surprised with new knowledge

In the report from 2006, the Danish Road Traffic Accident Investigation Board (AIB) presented its in-depth analyses of serious accidents between right-turning lorries and cyclists going straight ahead. The result was surprising.

The report was a quantum leap. Before that, it was believed that the cyclists were hit by the trucks' rear wheels, based on where they were found on the asphalt. But investigations of the Accident Investigation Board (AIB) showed that the vast majority of cyclists were hit by the lorries' right front wheels. It changed the perception of the accidents.

The report analysed 25 right-turn accidents, including nine fatalities that took place in eight months of 2005. Interviews were carried out with most of the drivers, the surviving cyclists and several witnesses, and the Accident Investigation Board (AIB) compared them with data from, for instance, police, emergency rooms, and the board's own inspections of the scenes of the accidents and the vehicles involved. In this way, they could – down to the last detail – point out the factors that were crucial in connection with the accidents and their severity.

The report concluded that the lorry drivers contributed to the fact that all the analysed accidents happened. They could have been avoided if the drivers had oriented themselves better or correctly in the correct mirrors at the right time. But the report also concluded that it can be difficult, in fact almost impossible, to look in the correct mirrors at the right time when you also have to turn a big vehicle to the right.

In nine of the analysed accidents, the drivers' lack of attention was a contributing factor to the accident, while this was true for three of the cyclists in the accidents. This was included in the recommendations.

Moreover, lorry-related issues played a part in 12 accidents. This primarily included errors in the adjustment of mirrors or the view from the truck's cab. In six of the



Photo: The Danish Road Traffic Accident Investigation Board (AIB)

The 16 recommendations of the Danish Road Traffic Accident Investigation Board (AIB) led the efforts in the fight against right-turn accidents up until 2014

1. Campaigns aimed at lorry drivers should focus on responsibility and attention
2. Campaigns aimed at cyclists should make them aware of their own vulnerability
3. Campaigns aimed at cyclists should also focus on due care and attention
4. Adjusting the mirror should be an easy task
5. Mirror adjustments and driver field of view should be inspected
6. The lorry driver learning courses and driving test should include correct adjustment and use of the mirrors
7. Focused police controls centred on lack of attention, visibility from the cab and incorrectly adjusted mirrors
8. Requirements of mirror or camera coverage of the lorry's front zone must apply to all lorries
9. Lorries should have a low-level window to the right and low-level windscreen
10. Requirements for a better field of view from the driver's cab should be imposed
11. Large vehicles with high driver's cabs should have restricted access to urban areas
12. The lorry mirrors should be placed together so that they can be viewed in one glance
13. New research should focus on the drivers' capabilities to judge the traffic situation by means of windows, mirrors and cameras
14. Camera solutions and sensor systems should be further developed
15. New rules should require lorries to make stop and check traffic prior to and during the turning manoeuvre
16. All signal junctions should be redesigned to improve safety for cyclists

accidents, inexpedient conditions in the road's design or surroundings were crucial reasons for the accidents.

The recommendations led the work

The 16 specific recommendations which the authorities and the stakeholders in the Right-turn Group could work towards implementing were a great strength of the report of the Accident Investigation Board (AIB).

Jesper Sølund from the Danish Road Safety Council says that the report's recommendations were crucial. Because of them, they were no longer looking for a specific, limited reason why the accidents occurred, and they found out that over 90 percent of the underlying factors were linked to human errors. The group members could do something to reduce these errors, for example by means of campaigns, vehicle technology and road engineering measures as well as police controls, periodic MOT tests and training of drivers.

Mirrors and the drivers' visibility

In the 1980s and 1990s, Denmark introduced a requirement for additional mirrors on lorries – wide-angle mirrors and proximity mirrors. But it turned out, however, that this was not enough to reduce the number of accidents.

Therefore, the preventive work focused especially on making drivers adjust and use the mirrors correctly. Seats were constructed where lorry drivers could test and adjust their mirrors and, adjusting and using mirrors became part of the training and driving tests for lorry drivers.

In cooperation with the Right-turn Group, the Danish Road Safety Council published leaflets in eight languages, so that also the increasing number of foreign drivers, who drove in Denmark and were not used to so many cyclists, were instructed in using the mirrors and informed about right-turn accidents.

Another focus area was to ensure good visibility from the lorry cabs, just as the Danish Road Traffic Accident Investigation Board (AIB) had pointed out. Here the police played a vital part, as the police and motor vehicle inspectors from the three Danish heavy-vehicle centres in Greve, Aalborg and Vejle carried out an increasing number of controls.

The controls focused both on the lorry mirrors and the visibility from the lorries' cabs. The report from the Accident Investigation Board (AIB) had pointed out that the lorries often had incorrectly adjusted mirrors and that the drivers' visibility was often poor because of various appliances and private objects placed in the windshields.

"We will continue to enforce the rules by checking mirrors and visibility in the lorries. It is of crucial importance that the mirrors are correctly adjusted," says Special Consultant Jørn Pakula Andresen from the Danish National Police, who is also a member of the Right-turn Group.

He explains that the police use so-called mirror cloths, tarpaulins of 8 x 12 meters, that the police place on the side of the lorries to check that the mirrors cover the required areas.

Visibility from the cab used to be a recurring problem, Jørn Pakula Andresen explains. The drivers had a habit of filling the cabs with stuff that piled up in front of the windshield.

"Some had hanging football pennants or family photos on the dashboard. We have also seen coffee makers, desks with open laptops and even a fax machine," Jørn Pakula Andresen says.

He explains that the police issue fines if drivers have blocked some of the view from the driver's seat.

"If it's really bad, and visibility has been significantly reduced, the driver can get a conditional disqualification from driving," Jørn Pakula Andresen says.

A long and difficult haul in the EU, concerning technical requirements for the lorries

The Danish Road Safety Agency has coordinated the activities of the Right-turn Group since the group was established. The Danish Road Safety Agency has both been subject to the Danish Transport Authority as well as it has had a more independent role. Therefore, you can find references to both The Danish Road Safety Agency as well as the Danish Transport Authority in the different documents on the right-turn efforts.

The Danish Road Safety Agency works, among other things, on affecting the international rules and require-



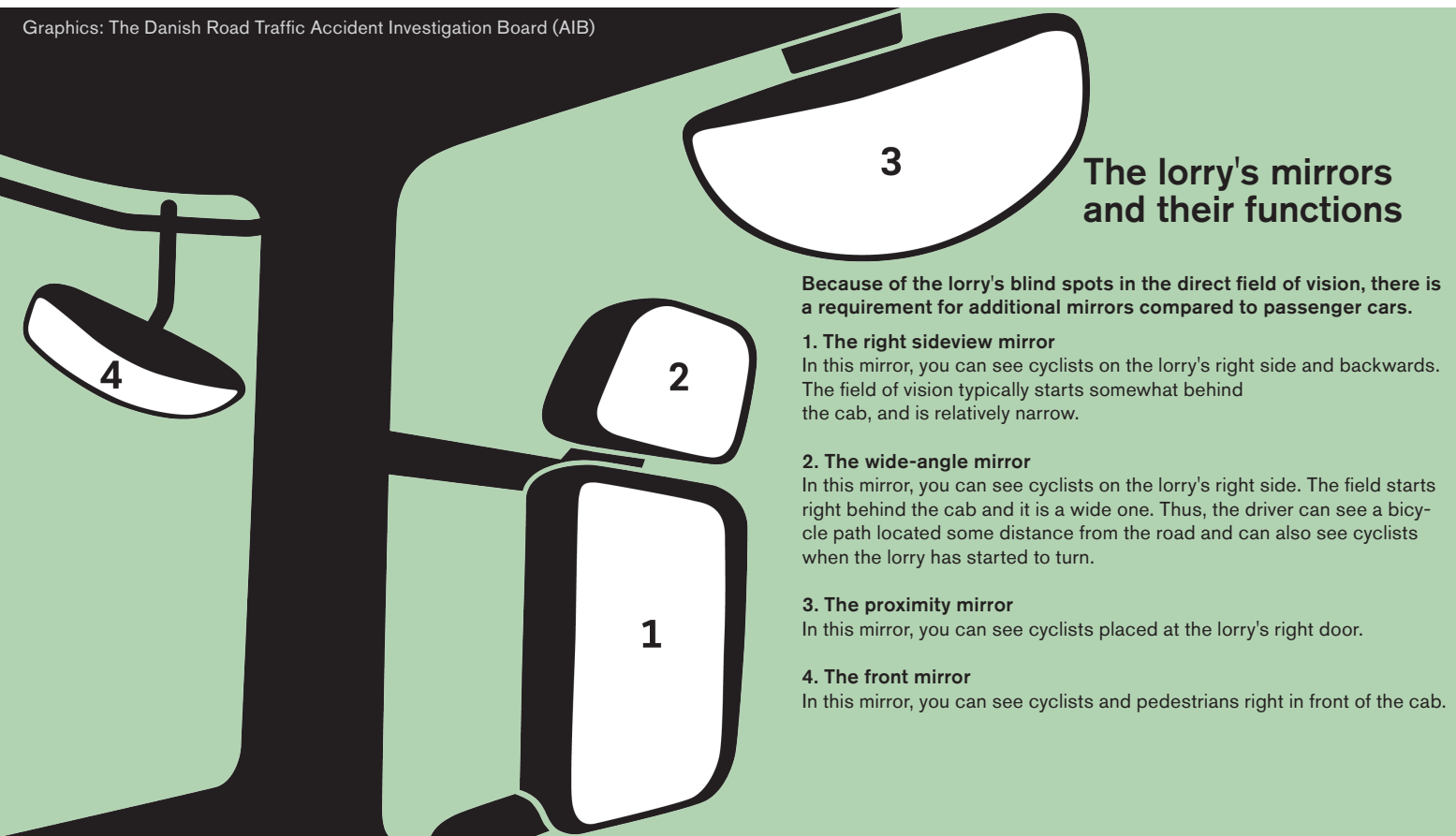
Photo: Central and West Zealand Police District

ments for the lorries. In 2004, Denmark had the requirement for a blind-spot mirror adopted by the EU, and in 2007 the EU adopted a directive that required that already operating lorries were also retrofitted with new mirrors with a curvature radius of 300 mm, which should make it easier for drivers to orient themselves about road users close to the lorry.

The Danish Road Safety Agency is also working on getting international rules in place that state that lorries must have low-built cabs so that drivers have to sit in front of the engine and not on top of it. This allows them to more easily see cyclists and pedestrians through the windshield. At the same time, the crash safety of the lorries must be improved for other road users.

The work is ongoing and has turned out to be challenging, Chief Consultant Leif Lorenzen from The Danish Road Safety Agency says.

Graphics: The Danish Road Traffic Accident Investigation Board (AIB)



The lorry's mirrors and their functions

Because of the lorry's blind spots in the direct field of vision, there is a requirement for additional mirrors compared to passenger cars.

1. The right sideview mirror

In this mirror, you can see cyclists on the lorry's right side and backwards. The field of vision typically starts somewhat behind the cab, and is relatively narrow.

2. The wide-angle mirror

In this mirror, you can see cyclists on the lorry's right side. The field starts right behind the cab and it is a wide one. Thus, the driver can see a bicycle path located some distance from the road and can also see cyclists when the lorry has started to turn.

3. The proximity mirror

In this mirror, you can see cyclists placed at the lorry's right door.

4. The front mirror

In this mirror, you can see cyclists and pedestrians right in front of the cab.

"We started in the United Nations in the UNECE (United Nations Economic Commission for Europe, ed.), and we have worked to get the requirements into EU directives. In 2003, the lorry manufacturers said that it might become a reality in 2022, and it now seems that it might be possible, since the working group will recommend the adoption of a proposal for an optional solution for the Commission in the course of 2019" Leif Lorenzen says.

AIB chairwoman Mette Fynbo says that several European transport ministers, including the French and German ministers, are keen to tighten up the directives to include stricter requirements on the roadworthiness of the lorries. These may, for instance, take the form of requirements on the design of lorry cabs so as to improve direct vision, or involve the introduction of technological measures such as automatic emergency brakes with cyclist sensors.

An increasing number of fatalities among cyclists leads to new initiatives

In 2013, an increase in the number of cyclists killed or seriously injured in right-turn accidents attracted new attention among media and politicians in Denmark. For four years, the number of fatalities had ranged between one and five, but in 2013 the figures rose to seven cyclists killed and 13 seriously injured. This led the Danish Minister of Transport to launch two initiatives.

Firstly, the ministry established a task force comprising representatives from the Danish National Police, the Danish Road Directorate and the Danish Transport Authority. This inter-ministerial team was asked to examine whether we in Denmark were in possession of the latest knowledge in the field, and whether we could learn from other countries' experience.

Secondly, the ministry requested the three authorities to draw up a new strategy with new recommendations. In addition to the findings from the work of the task force, this strategy was to build on input from a range of studies, enquiries from citizens and suggestions from the Right-turn Group.

The task force brought the cycle box back home with them

The task force consisted of Jørn Pakula Andresen from the Danish National Police, Victor Hollnagel from the Danish Transport Authority, and Mette Fynbo from the Danish Road Directorate, who was later named chairman of the Danish Road Traffic Accident Investigation Board (AIB) in 2014.

The group visited authorities, research institutions and companies in Germany, the Netherlands, Sweden and the UK, and the impression they gained during their visits was that Denmark was a pioneer in the field. Mette Fynbo relates:

"In all four countries, we encountered the same high focus on right-turn accidents, and it transpired that they were looking to Denmark and the measures we had introduced, such as the staggered stop line."

However, the task force did encounter one new initiative that Denmark had not yet established: the cycle box. This is a clearly marked field at the very front of the right-turn lane where cyclists can wait at red lights, making it easier for lorry drivers to see them.

"The Netherlands and Sweden were already using cycle boxes and we made them part of the new strategy. We decided to initiate large-scale trials with cycle boxes in Denmark, working closely with the municipalities," says Mette Fynbo.

The 2014 strategy analysed lots of suggestions

The task force's experience accounted for a significant part of the new strategy for the prevention of right-turn accidents, but the strategy also encompassed almost a hundred suggestions from citizens and organisations, some of which were put forward at a major meeting with the transport sector.

The strategy was released in March 2014 with a series of new recommendations and examples of initiatives that



Photo: The Danish Road Traffic Accident Investigation Board (AIB)

had been deselected, typically because there was no evidence that they worked, because they were likely to prove too costly, or because they might cause other problems.

This applied, for instance, to traffic mirrors at intersections. A Dutch study had previously demonstrated that these mirrors provide no help for drivers at critical times. The experts also advised against a controversial proposal to allow cyclists to ride in the opposite direction on cycle paths. This risked creating a variety of other problems – on roads without a cycle path, for example, where the cyclists would be riding in the opposite direction to the motorised traffic. Moreover, this particular suggestion would require significant changes to existing traffic legislation. The strategy recommended a number of measures for both the short and the long term. Many of the recommendations constituted a continuation of current actions and parts of the AIB report.

The most important recommendations were:

- Information and behaviour campaigns for lorry drivers and cyclists
- Considering an “orientation stop”, whereby the driver stops during the turn to get an overview
- A training package for the driver training programme that provides tools to help drivers avoid accidents when turning right
- Certification of safe commercial transports, whereby lorries are classified according to level of road safety
- Events for cyclists to provide them with information about limitations on drivers’ vision
- Continued police controls of lorry mirrors and drivers’ vision
- Obligation to fit a front mirror extended to include lorries registered before 2007 as well
- A number of already known road engineering measures such as staggered stop lines, separate regulation

of cycle traffic, pre-green signals for cyclists, separate right-turn lanes and truncated cycle paths.

- Large-scale trial of cycle boxes
- Increased knowledge about road intersection design for municipal authorities
- Research on the ability of drivers to maintain an overview of the traffic situation

New knowledge links accidents and road intersections

In the same way as in the immediate aftermath of the AIB report, the Right-turn Group set itself the assignment of applying in practice many of the recommendations set out in the strategy. At the same time, the various stakeholders in the group made sure to provide new information as a supplement to the work.

In 2016, the AIB published a new report that provided in-depth analysis of 30 accidents involving lorries. Of these, six involved cyclists, and four of these accidents were between a lorry turning right and a cyclist continuing straight ahead.

“A striking feature of this study was that all the accidents involving cyclists and pedestrians occurred in urban areas, and that half of these accidents could have been avoided if the lorries had a cab that offered better direct vision – a low-sitting cab with large side windows or glass doors, for example. This resulted in a number of recommendations, including a suggestion that purchasers of transport services – especially in the public sector – should require transport tasks in urban areas to be carried out using lorry types with good direct vision from the cab,” relates Mette Fynbo.

A quantitative analysis of right-turn accidents was the subject of the Danish Road Directorate memo entitled “Right-Turn Accidents – Cyclists and heavy vehicles”



Photo: The Danish Road Traffic Accident Investigation Board (AIB)



from 2017. In total, the report included 195 right-turn accidents that the police had registered in the period 2006–2015. The goal of the study was to identify the intersections where municipal authorities could achieve the greatest gains in road safety by making improvements. The Danish Road Directorate thus followed one of the recommendations set out in the 2014 Strategy.

“We linked right-turn accidents to the different types of intersections. It transpired that most accidents occurred in signal-regulated intersections in urban areas, where there are generally more cyclists and other factors to watch out for in traffic. In addition, the accidents occurred both when the cyclist and the lorry set off after stopping for a red light, and when the cyclist approached the intersection at speed while the lorry was setting off,” explains Marianne Foldberg Steffensen, Head of the Danish Road Directorate’s Department of Traffic safety and Cycling.

Statistics and knowledge about road safety have a crucial role to play in the work to create safe intersections, she believes.

“We need to adjust the initiatives according to the numbers, to avoid the risk of simply acting on the basis of what feels safe. For many years, it was usual to separate the cycle path and the turn lanes in intersections because it felt safe for cyclists. However, it transpired that in some cases it was safer to have motor vehicles and cyclists merge before the intersection itself. In many places, we have therefore truncated the cycle paths in the approach to the intersection itself.”

Many municipalities have also followed up on the numerous recommendations over the years, redesigning their

intersections or applying new road markings to prevent right-turn accidents. Politicians, too, have allocated financial resources for cycle funding, providing municipal authorities with financial support to improve safety for cyclists.

Future measures to be targeted at aspects such as road user behaviour

Most of the emphasis on future work to prevent right-turn accidents will be placed on influencing the behaviour of lorry drivers in particular, as well as that of cyclists. A number of stakeholders back this unanimously.

“It’s a question of having everyone pulling in the same direction. From the perspective of road technology and design, we have come a long way, because the big towns and cities are focusing heavily on intersections; so, the principal area to target now is to influence drivers’ behaviour and generate lasting changes in attitude. Cyclists can help themselves by taking more care and being more aware of the traffic around them, while lorry drivers need to shoulder their responsibility and comply with their duty to give way.

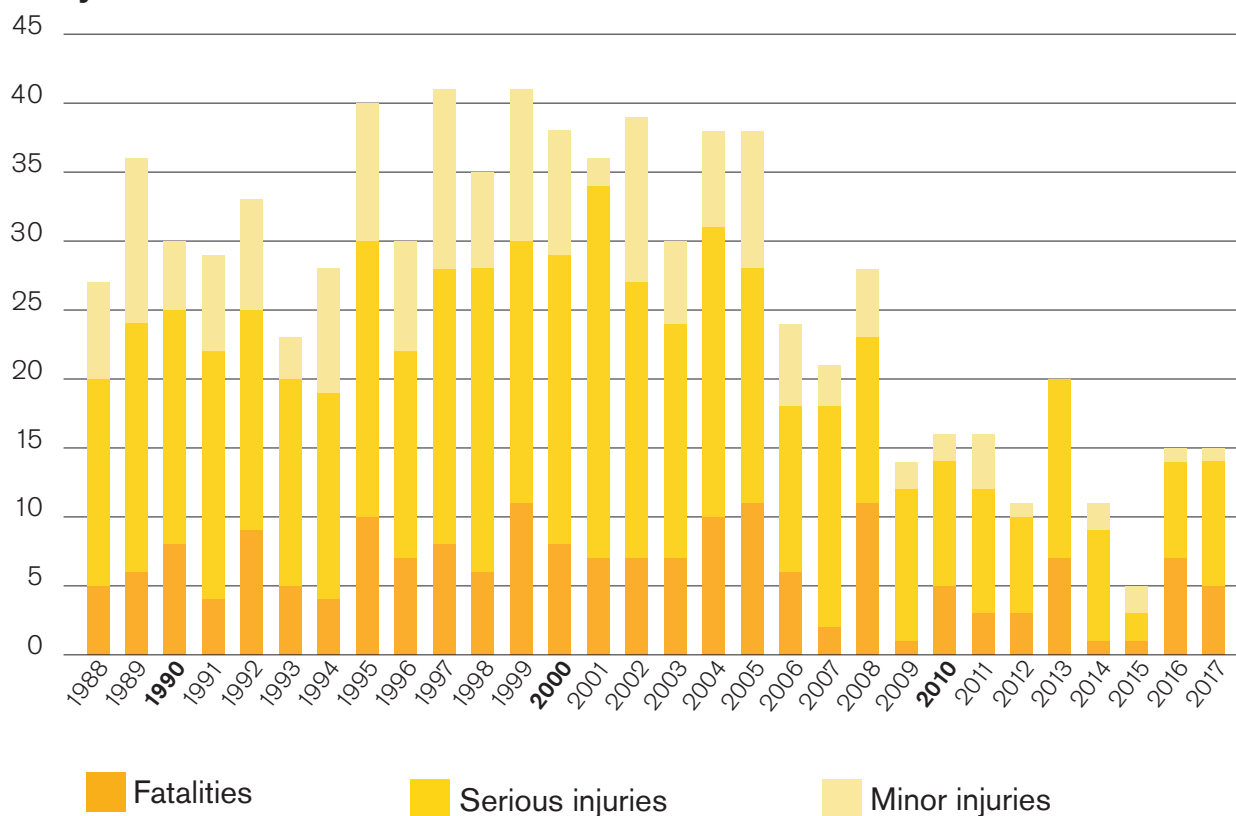
“At the same time, work should be done to help drivers through measures such as improving vision from the cab – on the basis of requirements imposed by the EU, for instance,” says Mette Fynbo.

Many of the stakeholders in the Right-turn Group also believe that the elevated focus on right-turn accidents should not be at the expense of other types of accident. The preventive input must be included on an equal footing with initiatives to combat other serious bicycle accidents.

Historical timeline of initiatives to prevent right-turn accidents

Overview of police registered right-turn accidents with fatalities, serious and minor injuries in the period 1988–2017.

Cyclist casualties in right-turn accidents between cyclists and lorries



1988

Denmark introduced a requirement that lorries over 6 tons must be fitted with two additional mirrors on the right-hand side – a wide-angle mirror and a close proximity mirror – and subsequently had this requirement included in the EU directive.

The Danish Road Safety Agency conducted a campaign on correct alignment of mirrors.



1992

The Danish Road Safety Council conducted a campaign to encourage drivers to adjust their mirrors correctly.



1994

The Danish Road Safety Council released a report which concluded that most lorries were operating with incorrectly adjusted mirrors, and that there might be blind spots. A number of recommendations are repeated in subsequent reports.

The Danish Road Safety Agency, and the Danish Road Safety Council published a new and improved brochure about correct adjustment of mirrors and ran a campaign on the subject.

2003

The Danish Transport and Logistics Association (DTL) and the United Federation of Danish Workers (3F) teamed up with companies and the Foundation for Child Accident Prevention (Børneulykkesfonden) to create the campaign entitled "Road safety at eye level", in which drivers showed schoolchildren how to avoid dangerous situations involving lorries. The campaign is still running.



2000

The Danish Road Directorate published the first issue of the "Catalogue of Cycling Concepts", which featured a range of recommendations for the design of safe intersections. The catalogue has since been updated.

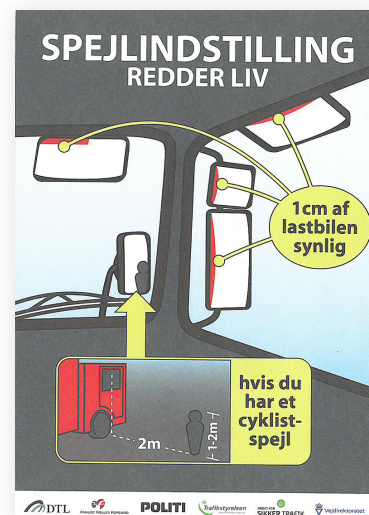
2004

The Danish Road Safety Agency introduced new requirements for mirrors on all lorries, irrespective of age; these requirements could, for example, be met by installing more curved wide-angle mirrors.

2005

The EU adopted the directive on retrofitting wide-angle mirrors on lorries. The Danish Minister for Transport established a cooperation forum for the prevention of right-turn accidents. The Danish Transport Authority was appointed coordinator for the group, which was originally named "The Mirror Group" (now called "The Right-turn Group").

The Danish Road Safety Council and The Danish Road Safety Agency joined forces with the Danish National Police to send a letter and a poster to all transport operators in the country. The material demonstrated a quick and easy way to check vehicle mirrors. That same year, the Danish National Police had proved in seven traffic controls that 85 out of 107 lorries were operating with incorrectly adjusted mirrors.



2006

The Danish Road Traffic Accident Investigation Board published the report entitled “Accidents involving lorries turning right and cyclists continuing straight ahead”, with an in-depth analysis of 25 right-turn accidents.

The Danish Transport Authority, the Danish Car Importers' Association, The Danish Transport and Logistics Association (DTL) and the United Federation of Danish Workers (3F) published a best practice memo to help businesses to set up lorries so as to ensure good vision for drivers.



2008

A mirror test area was established near the waste incineration plant, Amagerforbrændingen.

A number of organisations, including the Ministry of Transport, Ministry of Justice, the Danish Road Directorate, the Danish National Police, The Danish Transport and Logistics Association (DTL), the United Federation of Danish Workers (3F) and the Danish Road Safety Council, highlighted right-turn accidents through activities in six cities on European Road Safety Day.

2010

The Danish Road Safety Council repeated the right-turn campaign on TV, etc.



2007

The Danish Road Safety Agency and MOT companies introduced controls of vision and mirror adjustment during periodic inspections.

A mirror test area was established in the Kildebjerg South rest area on the island of Funen.

The Danish Road Safety Council initiated a right-turn campaign on TV, etc.



2009

The political parties behind 'a green transport policy' earmarked DKK 10 million for greater efforts to prevent right-turn accidents. On this basis, the Danish Road Directorate completed a number of measures including reviewing all signal-controlled intersections in the state road network, and 55 intersections were remodelled.

The Danish Road Safety Council repeated a right-turn campaign on TV, etc.

2011

The Danish Road Safety Council repeated the right-turn campaign on TV, etc.

The Danish Road Safety Council prepared leaflets about mirror adjustment for foreign drivers.

The Danish Road Directorate released the first edition of the publication entitled “Avoid right-turn accidents” containing descriptions of specific road engineering measures at intersections for use by municipalities (an update of the publication and a translation into English were published in 2015).

2013

The Danish Road Safety Council repeated the right-turn campaign on TV, etc.



Photo: Central and West Zealand Police District

2015

Headed by the Danish Road Safety Council, the Right-turn Group launched a new right-turn campaign in the media, backed by a poster campaign, etc.

A pilot project in selected companies with numerous lorry drivers trained drivers in becoming "right-turn ambassadors". The concept was developed by The Danish Road Safety Agency and the Danish Road Safety Council along with the Danish Transport and Logistics Association (DTL), the Confederation of Danish Industry (DI), International Transport Denmark - Trade association for the Danish road transport of goods, (ITD) and the United Federation of Danish Workers organisations (3F), and in direct dialogue with drivers.

The Danish Road Safety Council prepared the training package 'Turn Right Safely' with training materials for the drivers' statutory continuing educations at approved training centres, including Vocational Educational Centres, Adult Vocational Training Centres and private centres.

The Danish Road Safety Council published the leaflet 'Turn Right Safely' in several languages for Danish and foreign drivers.



2017

The Danish Road Directorate published the report 'Right-turn Accidents – cyclists and heavy vehicles'.

The Danish Road Directorate apportioned funds to municipalities to prevent right-turn accidents focusing on initiatives related to road design

2014

The Danish parliament allocated funds for a major campaign targeted at drivers, transport companies and cyclists.

The Danish Road Safety Agency, the Danish Road Safety Council, the Danish Road Directorate, the Danish National Police, the Danish Road Traffic Accident Investigation Board and other organisations conducted a variety of informative and promotional activities in 2014–2016.

An inter-ministerial task force comprising the Danish National Police, the Danish Transport Authority, and the Danish Road Directorate described foreign experience with work to prevent right-turn accidents.

The Danish National Police, the Danish Transport Authority, and the Danish Road Directorate published the "Strategy to prevent accidents between straight going bicycles and right turning lorries".



Photo: The Danish Road Safety Council

2016

The Danish Road Traffic Accident Investigation Board (AIB) published a report on lorry accidents with in-depth analyses of 30 accidents, including four right-turn accidents involving lorries and cyclists.

The Danish Road Safety Council conducted the campaign 'Prevent right-turn accidents' in cooperation with the Ministry of Transport, the Danish Road Safety Agency and 13 organisations and companies.

The Danish Road Directorate apportioned funds for cycle boxes to the municipalities that wished to create such cycle boxes.



Photo: The Danish Road Directorate

The Right-turn Group develops new initiatives

As members of the Right-turn Group, representatives from several authorities and organisations with very different interests have for 13 years cooperated towards a common goal of reducing the number of right-turn accidents. The strength of the group is that here stakeholders reach consensus on initiatives based on discussions and through that they ensure an increased impact of their work.

A forum where a cyclist organisation discusses right-turn accidents with the hauliers' organisations and the drivers' trade union may sound unrealistic – or rather difficult.

But the Right-turn Group forum has proven to be viable – perhaps because it also involves several other key players: Researchers qualifying knowledge; representatives of ministries and government agencies drawing up new rules and guidelines; police officers having to enforce them, and campaigners communicating traffic safety in order to create behavioural changes.

The group being so broad in its composition and having representatives meet with various professional competences and interests have been vital to ensure impact of work. Several of the members share this opinion.

“The cooperation is unusual and rather unique. Although the Danish Cyclists' Federation may disagree with the transport organisations and the drivers, they keep it civil. All of them work together to combat right-turn accidents. “We try to achieve as much as possible by consensus,” says Mette Fynbo, chairwoman of The Danish Road Traffic Accident Investigation Board (AIB).

Other members stress the fact that the initiatives and proposals from the group become more viable when the various parties in the industry participate in the development and alignment of them.

“We test the ideas. In the Danish Road Safety Agency, we may, for example, come across a technical issue related to vehicles or a road issue in the Danish Road Directorate; however, it may not make sense to cyclists or drivers. In the group, we can put such issues to the test,” says Chief Consultant Leif Lorenzen from the Danish Road Safety Agency.

“We could, for example, also have a discussion with the Danish Cyclists' Federation about the reason why it would often be a safer solution to shorten cycle paths leading up to intersections, so that they can pass on the information to their members. In this way, we avoid misunderstandings,” says Marianne Foldberg Steffensen, head of the Danish Road Directorate's Department for Traffic safety and Cycling.



Photo: The Danish Road Traffic Accident Investigation Board (AIB)

Room for both differences and common solutions

Over the years, the members have typically held two meetings per year at which they have exchanged information and coordinated initiatives. Each member works with his individual field of work along with the meetings.

The Danish Road Safety Agency is the group coordinator and handles technical matters related to vehicles and EU directives, while the Danish Road Directorate handles the numbers of accidents and investigations of, among other things, road engineering measures. The Danish Road Traffic Accident Investigation Board (AIB) contributes with detailed knowledge of the conditions that cause accidents and recommendations for preventing them.

The Danish National Police adds knowledge of roadside controls, and The Danish Road Safety Council put, among other things, campaign materials to the test among the group members. Transport organisations and the trade union 3F plead the drivers' and industry's causes and have an influence on the drivers, while the Danish Cyclists' Federation has a similar effect on the cyclists. Kjeld Jensen from 3F has been involved from the beginning in 2005, and he imposed one condition.

"At that time, the media were giving the drivers a hard time, and I would only join the group if we agreed that we would treat each other with respect. In general, we have met that requirement. We have disagreed, but our discussions remained confidential, and we have managed to find common solutions. And the approach of the media has changed. They see that accidents also affect the drivers psychologically," says Kjeld Jensen.

Klaus Bondam from the Danish Cyclists' Federation recognises this.

"We may be the naughty boy in the class, but we do not shout at the drivers. We look at the accidents and initiatives from the cyclists' point of view, and the other members have responded to our approach very positively. We have also cooperated with ITD (the trade association for the Danish road



Photo: The Danish Road Directorate



Photo: The Danish Road Directorate

transport of goods,) on campaigns," says Klaus Bondam.

A united group provides a common approach

When an agreement has been reached in the group, it is easier to identify effective initiatives, several members explain. When the Right-turn Group announces an attitude or a proposal, the decision makers know that the industry and the authorities have dealt with it thoroughly.

"In the group, the stakeholders listen to each other and due to that, the politicians will receive the same statement regardless of the party they ask. In this way, we avoid expressing our disagreements loudly in the press, and agreeing on objectives and means becomes much easier," says Marianne Foldberg Steffensen.

Jørn Pakula Andresen from the Danish National Police stresses the fact that the group has no authority to change any rules or regulations. But he believes that ministers tend to be prepared to adhere to well-prepared proposals from a group of organisations representing various approaches and interests.

Foreign countries look to the group

Several group members report that their foreign partners have been surprised by the fact that cyclists, hauliers and drivers' organisations discuss road safety with the authorities.

"Foreign countries look to the Right-turn Group in Denmark as such groups do not exist in any other country. According to the international players, they are envious," says chief consultant Leif Lorenzen from the Danish Road Safety Agency.

Specialist consultant Pernille Ehlers from the Danish Road Safety Council shares the same experience.

"I described the work of the Right-turn Group at a conference in Sweden, and an English participant wanted to hear about the cyclists' approach to the work. She was very surprised to hear that the Danish Cyclists' Federation was part of the group. Are they able to cooperate with truckers associations?" she asked.

Klaus Bondam explains that also the European sister organisations to the Danish Cyclists' Federation are impressed by the fact that the Danish Cyclists' Federation cooperates closely with truckers associations, the police and the authorities.

He explains, among other things, the work of the Right-turn Group to the European Cyclist Federation, which the Danish Cyclists' Federation once helped establish.

"I think the Danes are quite adept at solving problems together and clearing the way for meeting of minds even though we do not share the same interests," says Klaus Bondam.



The members of the Right-turn Group

**The Danish Road Safety Agency
(coordinator)**
www.fstyr.dk

The Danish National Police
www.politi.dk/da/ompolitiet/rigspolitiet

The Danish Road Directorate
www.vejdirektoratet.dk

**The Danish Road Traffic Accident
Investigation Board (AIB)**
www.havarikommissionen.dk

**Transport DTU
(Technical University of Denmark)**
www.transport.dtu.dk

The Danish Road Safety Council
www.sikkertrafik.dk

The Danish Cyclists' Federation
www.cyklistforbundet.dk

**The Danish Transport and
Logistics Association (DTL)**
www.dtl.eu

International Transport Denmark (ITD)
www.itd.dk

The Danish trade union, 3F
www.3f.dk

The Danish Car Importers' Association
www.bilimp.dk

Danish Society of Forensic Science
www.forensic.dk

Ministry of Justice
www.justitsministeriet.dk

**The Ministry of Transport,
Building and Housing**
www.trm.dk

Campaigns are aimed at cyclists and drivers

With campaigns approximately every second year, the Danish Road Safety Council has made the cyclists and lorry drivers pay attention to how they can prevent right-turn accidents. According to the Council, we have to remove the excuses for thinking that things like that will never happen to us, and if people become uncomfortable, that's fine.

The trumpets herald an apocalypse when the young woman with the wind blowing in her hair and coat approaches the intersection on her bicycle. A black shadow from a lorry is looming up beside her, a waiter looks up from the cafe on the corner, and the viewer anticipates the worst. But the lorry stops and indicates to turn right in a few decisive seconds, and after that the camera zooms in on the attentive driver's face. The woman slows down a bit, checks if the lorry is still waiting, and in the next video clip the woman, relieved, rides her bicycle straight through the intersection.

"Prevent right-turn accidents. Watch out and keep a safe distance to the front wheel of the lorry," the announcer advises in the 35-second video showing a red area on the asphalt next to the right front wheel of the lorry.

This is the latest video in a series of TV spots launched by the Danish Road Safety Council approximately every second year as part of the campaigns on right-turn accidents. The video was designed and tested to the last detail in cooperation with the Right-turn Group.

"From the Danish Road Traffic Accident Investigation Board's report on right-turn accidents, we could see that cyclists involved in accidents almost always are hit by the right front wheel of the lorry, and in the Right-turn Group we agreed that the message should be

'Stay away from the right front wheel'. We then started to develop the campaign," says the specialist consultant Pernille Ehlers from the Danish Road Safety Council.

The primary target group is cyclists aged between 18 and 60 in the cities, and the video campaign ran in 2015 and 2016 in cinemas, on TV, online newspapers, websites and YouTube. Additionally, the Danish Road Safety Council sent campaign materials about right-turn accidents and how to prevent them to the media.

Employees went for a drive with the lorry drivers

The campaign is also aimed at the lorry drivers who should be just as attentive as the driver in the video clip. The Danish Road Safety Council has therefore thoroughly researched the issue.

"At first, we went for drives with three lorries to see how the drivers experience the traffic in cities and to learn about their view. And when we recorded the video, a motor vehicle inspector joined us and explained exactly how the cyclist and the lorry should move and where things should take place. We wanted to remove people's excuses for thinking that things like that would never happen to them, or that somebody else should solve the problems. We wanted to prevent drivers from saying 'it will never happen in that intersection or with such a lorry'. Or 'the cyclists are also terrible in traffic.' We therefore show both what the cyclists and the drivers should do, so that both parties take on their responsibilities," says Pernille Ehlers.

For the same reason, the council tested the campaign on both cyclists and lorry drivers, and both parties evaluated the campaign positively. The council also interviewed lorry drivers, and here it was revealed that many of them did not realise that cyclists were hit by the front wheels of the lorry.

"They have to know that cyclists are hit by the front corner of the lorry. We therefore marked a red circle on the asphalt around the right front wheel of the lorry in the campaign. We call it the critical zone."

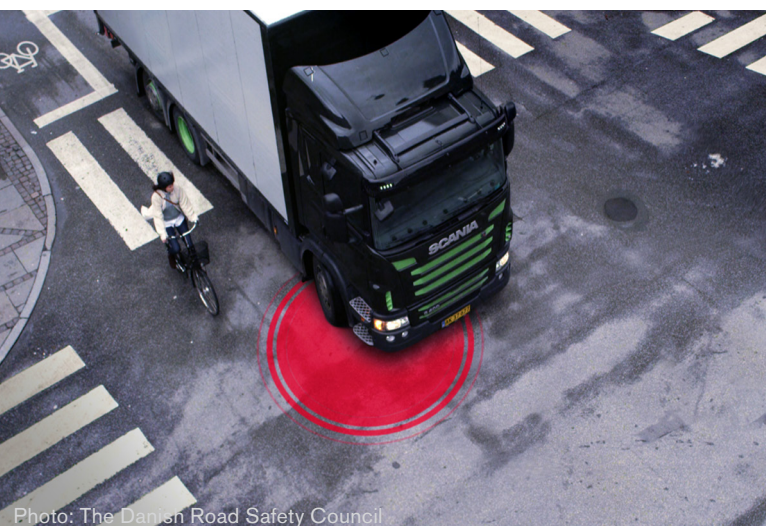


Photo: The Danish Road Safety Council

The council especially wanted to warn cyclists

Previous campaigns had told the cyclists that they risk being overlooked by lorry drivers. This was the theme of the campaign 'The invisible woman', which ran from about 2005 to 2010. Here a video showed a woman riding her bicycle and the moment when she becomes invisible to the lorry driver. On the soundtrack, we hear that the woman is run down.

The campaigns have especially been aimed at cyclists, although the council knows that lorry drivers are frequently to blame for the accidents as they often do not pay enough attention to other road users. The documentation manager of the council, Jesper Sølund, explains this.

"Our primary intention was to warn cyclists and give them specific instructions on how to act. They must know about safe and unsafe spots and how to act when a lorry comes. And if they notice that a lorry indicates to turn right, it is a good thing if they feel a bit of unease," says Jesper Sølund.

The transport industry and the Danish Cyclists' Federation conduct campaigns of their own

The public campaigns are often linked to the number of right-turn accidents and thus to public awareness. In that way, the campaign in 2014 was based on a year with yet another increase in the number of accidents. In 2013, seven cyclists were killed in accidents involving lorries turning right, even though the efforts from 2006 and onwards had reduced the number of fatal accidents to 1-5 per year.

The Danish Road Safety Agency cooperated with the Danish Road Safety Council to develop the campaign 'Prevent right-turn accidents'.

In addition to the campaign for the cyclists, training materials were also prepared for the drivers' continuing education as well as schemes with right-turn ambassadors for companies with many lorry drivers. Both initiatives were launched by the Danish Road Safety Council in cooperation with the Danish Road Safety Agency and, among others, the trade union 3F, the Confederation of Danish Industry and the transport business associations DTL and ITD.

The private actors also conduct campaigns on their own. The transport industry offers, among other things, two campaigns to all schools in the country, and the Danish Cyclists' Federation also regularly informs its members of right-turn accidents and how to prevent them.

"We repeatedly tell the cyclists: 'Do not insist on your rights. Watch out for lorries. Be careful when you are next to a lorry. It is wiser to stay behind the lorry and wait until it turns. Or – if there is a cycle path – you should ride up to the front of it and wave at the driver,'" says Klaus Bondam, the director of the Danish Cyclists' Federation.

The teaching materials for the driver training programme used in both basic and supplementary training.

The package consists of:

- Teacher's guide which briefly describes the objectives, structure and use of the material.
- PowerPoint presentation comprising four topics for use in the teaching. Each slide has associated notes and keywords for the teacher.
- Facts about right-turn accidents – background information for the teacher. A fact sheet with the latest information about right-turn accidents to allow participants to discuss myths and misconceptions, and to determine what is right and wrong.
- Eight practical exercises to give participants practical experience.
- The quiz – Check your knowledge about right-turn accidents – can be used to open and close the course and serves to indicate what the participants have learned.



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Tryk på Rapporteringen

Right-turn viewed from the cab of the lorry

A right-turn requires a lot of the lorry driver. He must turn his long vehicle around obstacles and keep an eye on traffic light signals, other drivers, pedestrians and cyclists around the vehicle. A driver will have to live with the consequences of a fatal accident for the rest of his or her life, so the industry is committed to helping prevent accidents.

Henning “Baloo” Olsen, a 55-year-old lorry driver, is constantly afraid that something will go wrong with a right-turn. Every day, he manoeuvres his Volvo FH500 lorry – which is 16 metres long and weighs up to 50 tons – to and from Frihavnen port in Copenhagen.

“I fear the worst whenever I turn right. Cyclists appear from directions you least expect. You can be stopped at an intersection and not expecting anyone to come along, and then suddenly there’s a racer or an electric bike next to you. I have to have eyes in the back and sides of my head when I turn right,” relates Baloo.

Like other drivers, he keeps an eye out for cyclists using the four legally required mirrors that cover the critical right side of the lorry.

A front zone mirror above the windscreen points down so he can see whether there are any pedestrians or bicycles in front of the cab, where he sits two metres

above the ground. Two mirrors on the front, right-hand pillar provide visibility two metres diagonally to the right of the lorry and down along the right side of the semi-trailer. And a close proximity mirror above the right side window shows whether there are any cyclists next to the right front door. Baloo has also installed additional cameras on his lorry.

Nevertheless, he says it is still difficult to make a right-hand turn in the Copenhagen rush hour. He often has to drive a long way into the intersection before making the turn to be sure that the long semi-trailer does not hit anything on the corner.

“I have to keep an eye on so many things. I have to make sure not to make contact with signs, traffic lights and canopies, for example, and when I turn sharply to the right, the lorry bends in the middle, which cuts off visibility along the left-hand side and partially obstructs your vision along the right-hand side as well. At the same



Photo: The Danish Road Traffic Accident Investigation Board (AIB)



time, I find it distracting when cyclists do unpredictable things like driving in the opposite direction to the other traffic, running red lights, or riding on the pavement. Briefly put, when they are where they shouldn't be," says Baloo, who has had "Baloo keeps an eye out for cyclists" printed on his t-shirt.

Drivers never forget a fatal accident

Drivers who runs cyclists down never forget it, according to Kjeld Jensen, an environmental consultant at the United Federation of Danish Workers (3F), which is the drivers' trade union.

He gives an example of how deeply a fatal accident may affect the driver.

"A driver caused a fatal accident in a right-turn. He still drives the same route every day in his lorry, but since the accident he continues straight ahead at the intersection where the cyclist died and then makes three left turns. He does so to this day. This shows just what is going on in the driver's mind," says Kjeld Jensen.

The Danish union 3F does what it can to help drivers who accidentally run people down. The union operates a hotline to put these drivers in touch with professional counsellors who can help them try to deal with both the psychological and the legal fall-out from the accident. This is because the Danish Road Traffic Act assumes that lorry drivers are responsible for right-turn accidents involving cyclists.

"Some are really offended that the police charge them with negligent manslaughter, but they also feel guilt. Many say 'I don't understand it ... I was sure I'd checked in every direction.' But these are all confessions. They aren't running away from their responsibility. "

Kjeld Jensen explains that with the assistance of 3F, most drivers manage to start driving again.

“But the traumatic experience stays with them, and they’ll never get over it completely. At best, they can learn to live with it,” says Kjeld Jensen, representative of the 3F union in both Right-Turn Group and the Danish Road Safety Council.

The Danish Transport and Logistics Association (DTL): Drivers and cyclists share the responsibility

Frank Davidsen, Vice President of the Danish Transport and Logistics Association (DTL), explains that goods carriers focus heavily on road safety. And that both drivers and carriers are deeply concerned about tragic right-turn accidents.

“We’re committed to doing everything we can to avoid them. The unfortunate person who’s run over isn’t the only victim. You have to remember the devastated driver behind the wheel, as well as any witnesses who saw the accident. A number of goods carriers have been involved in accidents of this kind, relates Frank Davidsen.

DTL has not questioned the conclusions in the reports from the Danish Road Traffic Accident Investigation Board (AIB). Both the 2006 report on right-turn accidents and the 2016 report on accidents involving lorries conclude that the drivers should have done more to check their surroundings. Frank Davidsen is nevertheless convinced that the issue is not quite as clear cut in reality.

“We’re trying to put our own house in order first, by stating that we need to do better. At the same time, however, it’s important that all road users show respect for one another in traffic and pay proper attention to each other,” he says.

DTL’s work includes teaching children how to stay safe around lorries. In partnership with the 3F union and other stakeholders, DTL has launched the “Road safety at eye level” campaign, which is designed to teach third to fifth grade school pupils how to act around lorries – as both pedestrians and cyclists. DTL would like to reach an even broader audience, however.

“We want lessons about lorry safety to be taught in primary and lower secondary schools; it might even be possible to prepare some teaching material that involves the family and the household. Something happens when children become teenagers and start to play a different role in traffic,” says Frank Davidsen.

The media has adopted a more subtly defined picture of the accidents

Kjeld Jensen from the 3F union believes that media focus has shifted from the image of lorries as killing machines to the issue of how difficult it can be for lorry drivers to check in all directions during a right-turn.

“Ten years ago, the press made it sound like the drivers got out of bed in the morning with the express intention of killing someone. Today, reporters take a completely different view of the issue. They understand that while there is a physical victim, the drivers themselves are not indifferent – they are actually deeply affected by the incident.”



Photo: The Danish Road Directorate



Photo: DTL/Claus Fjell

Songs and games teach the youngest children about lorries

- The Lorry Caravan is the name of another campaign centred on lorries and road safety
- The target group comprises pupils from preschool age to second grade at schools throughout Denmark, which one or more lorries – and their drivers – visit free of charge
- The main character “Magda” sings and dances with the pupils, who have the opportunity to climb up into the cab and look out
- At the same time, police officers are present to talk about road safety and cycling regulations
- The pupils are given high-visibility yellow vests, and the schools receive “class packs” containing books and posters
- The visits last two hours
- The campaign has been prepared by International Transport Denmark (ITD), - the trade association for the Danish road transport of goods.

Source: Lastbilkaravanen.dk and itd.dk

Teaching schoolchildren how to deal with lorries turning right

- The “Road safety at eye level” campaign is targeted at third to fifth grade pupils
- Participating schools receive a visit from a lorry, which is parked in the school playground
- Specially trained drivers give the children a set of simple rules to teach them how to avoid dangerous situations involving lorries, and children have the chance to see for themselves how complicated it is to make a right-turn in a lorry
- “Road safety at eye level” has been created and is financed by the following stakeholders: The Danish Transport and Logistics Association (DTL), the United Federation of Danish Workers (3F)’s Transport Group, Danske Fragtmænd A/S, the energy company OK, Volvo Lorrys Danmark A/S, Codan insurance company and the Foundation for Child Accident Prevention (Børneulykkesfonden).
- The campaign has reached more than 100,000 children since its launch in 2003

Source: Børneulykkesfonden.dk



Photo: The Danish Cyclists' Federation

Municipalities and the Danish Road Directorate work together for safe intersections

The work by the Danish Road Directorate to analyse accidents and examine new preventative measures provides municipal authorities with additional tools to create safer roads in places where there are most cyclists.

The Danish Road Directorate collects and disseminates the latest knowledge about what works best in securing intersections against right-turn accidents. With the publication “Avoid right-turn accidents” the Danish Road Directorate presented five specific road engineering measures with the potential to improve road safety for cyclists. Many municipalities now use these measures: staggered stop lines, blue cycle markings, truncated cycle paths, cycle boxes and separate signals.

The municipal authorities throughout Denmark constitute an extremely significant partner in the work to prevent right-turn accidents. This is because the municipalities are responsible for most of the intersections in towns and cities where lorries and cyclists meet.

“The Danish Road Directorate remodels intersections on main roads, but the municipalities handle a high share of everyday traffic – especially in places where cyclists

travel. They are responsible for almost all the roads in the towns and cities, where a large proportion of accidents involving right-turns occur. The Danish Road Directorate makes sure that the municipal authorities have access to the latest knowledge with regard to their road safety input. We want to put our knowledge to work,” says Marianne Foldberg Steffensen, head of the Danish Road Directorate department for road safety and cycling.

The Danish Road Directorate was also responsible for distributing state funds to municipalities that were keen to participate in the large-scale trial involving cycle boxes, or wanted to remodel intersections so as to help prevent right-turn accidents.

In the period before and after the publication of the AIB report on right-turn accidents in 2006, municipal authorities remodelled hundreds of intersections. The report emphasised that carrying out remodelling work, estab-



Photo: The Danish Road Directorate



Photo: The Danish Road Directorate

lishing signals and improving road marking could have prevented some of the 25 accidents analysed. And many municipalities adopted the recommendations for measures such as moving the stop line for cars back five metres or, using separate signals for cyclists continuing straight ahead and for cars turning right.

Safe intersections described in leaflets, road standards and handbooks

The Danish Road Directorate is a major stakeholder in regard to disseminating information about what works in intersections. The Road Directorate publishes booklets on subjects such as safe intersections and “effect handbooks” that set out the prices of the different solutions and calculate the benefit to society.

“The municipalities need as much road safety as possible for their money, and the Road Directorate is working to provide them with an overview of how they can get it,” explains Marianne Foldberg Steffensen.

Road standards:

The Danish system of road standards is unique in that it is built on a broad partnership between the public and private sectors, where various interest organisations can also influence the work via the Danish Road Standards Council. The comprehensive Danish road standards have been prepared by a number of permanent committees, which initiate relevant studies and incorporate international knowledge in order to ensure that the road standards are up-to-date with the latest knowledge in safe and efficient planning, project design, execution and operation of roads, streets and associated structures.

The Danish Road Directorate ensures a broad working relationship with the municipal authorities, and also disseminates knowledge about safe intersections through road standards groups, theme days and conferences.

The Danish Road Standards contain recommendations for good intersections, with detailed advice about a wide range of features – right down to the design of the kerbstone. These standards are prepared via a working relationship between municipal authorities, the police force, consultancy companies and the Danish Road Directorate.

In addition, the Danish Road Directorate has invited municipal technicians to theme days about right-turn accidents, where experts – including signal engineers – have contributed advice about safe intersections.

Moreover, municipal road engineers, police officers and experts from the Danish Road Directorate meet at an annual conference on road safety to discuss new road safety initiatives, including measures designed to prevent right-turn accidents.

The Danish Road Directorate has also established a digital forum – Vejnettet.dk – where employees of local authorities, the police and the Danish Road Directorate can “meet” to present new knowledge and to discuss methods and initiatives.

Through the ongoing working relationship, knowledge from the Danish Road Directorate reaches the municipalities, and the different issues can be discussed in various forums.



Photo: The Danish Road Directorate

Aarhus makes cyclists more aware of lorries

In the hilly city of Aarhus cyclists often pick up speed. This means that they can be travelling extremely fast when they approach intersections where lorries are preparing to turn. This situation has influenced the municipality's approach to right-turn accidents. The municipality wants to warn cyclists in particular, so as to help them avoid ending up under a lorry.

Rumble strips on cycle paths and flashing signs to warn cyclists about lorries turning right. These two initiatives highlight Aarhus' particular focus on avoiding the fatal accidents.

"A lot of right-turn accidents can be avoided if cyclists are aware of the lorries. In a hilly city like Aarhus, cyclists often pick up a lot of speed on the downhill, and this is especially dangerous at intersections where lorries are turning. We focus heavily on cyclists in motion," relates Pablo Celis, civil engineer and former employee of the municipality's Centre for Urban Development and Mobility.

The municipality has set up rumble strips 25 metres in front of several intersections to warn cyclists.

"The sensation from the strips lets them know there's something important up ahead. They stop pedalling, apply the brakes and become vigilant. This is important when cyclists are approaching an intersection at high speed, because it can otherwise be difficult for lorry drivers to spot them in time. Rumble strips have reduced the number of accidents in the most dangerous intersections," says Pablo Celis.

He goes on to explain that the municipality chose rumble strips after testing how little it takes to stimulate cyclists' awareness.

Signs warned about lorries turning right

The municipality had previously set up a pilot system that warned cyclists about lorries turning right at the intersection between Ringgaden – the inner ring road – and Søren Frichs Vej. Fixed warning signs were erected both 100 and 50 metres before the intersection, and a sign right at the junction flashed a warning whenever a lorry was about to turn right.

"This improved interaction between cyclists and lorries, thus generating more awareness," relates Pablo Celis, who adds that the pilot system ran for two years.

The municipality then chose to discontinue the project because, compared to other measures to help prevent right-turn accident, it was considered too expensive to expand the solution to additional intersections.

Just like in other municipalities, the authorities in Aarhus have attempted to prevent accidents through a range of other measures, including moving stop lines for cars and lorries back to give drivers a better view of cyclists. The municipality has also remodelled intersections with "pre-green" signals for cyclists, truncated cycle paths and established separate right-turn lanes for cyclists. It has also recently established around ten cycle boxes.

What is more, Aarhus is currently working on the third of seven "super cycle highways" in the municipality. These paths are expensive, however, because they are to run between the busiest traffic arteries, but this is a good way of providing cyclists with dedicated routes that keep them away from heavy traffic.



Photo: Municipality of Aarhus

The work to make safe intersections in Odense is complex

Odense's work to improve road safety takes the form of a systematic review of the intersections and the use of multiple data sources.

Troels Andersen, Traffic Planner at the Municipality of Odense, explains that the work to improve the 200 signal-controlled intersections in the city is a long-term project that has been under way for many years. It is both expensive and complex.

"Every time we have to work on an intersection for any reason, we remodel it to make it safer for traffic. We can create different phases, so each type of road user has its own green light phase at traffic lights. Of course, it does cause more congestion when we run the traffic more slowly through the intersections. This is because we have to set the intergreen times according to the worst case scenario, to ensure that everyone can clear the intersection before the light changes to green for the others," explains Troels Andersen.

The traffic planner goes on to emphasise that the municipality remodels intersections on the basis of the latest road safety knowledge. The municipality therefore supplements accident statistics from the Danish Road Directorate with emergency room data, which also include minor injuries. The municipality uses these data to identify "black spots" – dangerous intersections in particular.

"You can't plan the remodelling of an intersection on the basis of one serious accident when this accident could just as easily have occurred in 100 other intersections. This is like planning blindfolded."

Troels Andersen explains that moving a single stop line is much more difficult than it looks. "This is because there are often loop detectors underneath the asphalt to detect the presence of road users. And these loop detectors naturally have to be dug up and moved along with the line."



Photo: Municipality of Odense



Photo: Municipality of Odense

Fixed requirements resulted in road-safe garbage trucks in Copenhagen

Garbage truck drivers in Copenhagen are now better able to see cyclists and pedestrians in traffic. The municipality introduced, on the basis of the AIB recommendation, a requirement for road-safe trucks into the tender for renovation services. The next step could be requirements on other types of trucks, but this would need a European consensus.

Garbage collectors in Copenhagen have a better view of cyclists and pedestrians than in many other cities. This is because the lorries used in municipal garbage collection have been designed with low cabs, lowered windscreens and extra glass panels – in the right-hand door, for example.

The reason for this is that the City of Copenhagen has used its size to make demands when the authorities put garbage collection services up for tender.

“As from 2009, we added a fixed requirement to the contract stating that garbage trucks should have low cabs with plenty of glass. We could do so because we are such a big local authority that the collection companies’ vehicles are primarily used in the city itself,” relates Søren Troels Berg, Coordinator for Road Safety in Copenhagen.

He explains that the City of Copenhagen was able to make this demand because it pays for the services itself. The city is divided into various tender areas, covered by four to five suppliers. You may still encounter a garbage truck in Copenhagen without a lowered windscreen and extra glass in the door, however, because some companies have their garbage collected by service providers not covered by the municipal system.

That said, the phenomenon of road-safe garbage trucks has started to spread to the neighbouring municipalities, partly because the service providers tend to purchase garbage trucks that they can use in Copenhagen as well.

Municipal vision will require safer lorries

The garbage trucks should ideally be the first step. The City of Copenhagen has adopted a Vision Zero plan



Photo: The Danish Road Traffic Accident Investigation Board (AIB)



Photo: The Danish Road Traffic Accident Investigation Board (AIB)

whose aim is to ensure that no-one is killed or seriously injured in traffic. The initiative involving safe garbage trucks should ideally be extended to cover other types of lorries as well.

“We are trying to build the roads to make them as easy as possible to use, so that we can eliminate the mistakes that lead to accidents. In the same way, we’re keen to make sure that the lorries are so good that drivers avoid mistakes and accidents. It’s just easiest for us to demand this from the transport services we pay for ourselves because we can write it into a tender,” says Søren Troels Berg.

Other measures in the long term may include safety zones for lorries, a type of certification system or a star system like the one in the European EuroNCAP programme that awards cars one to five stars based on their level of road safety.

“We still have a long way to go. We need to reach agreement with the other big cities in Europe regarding which demands to make, because it might lead to unfair competition if we have special requirements that only Volvo can fulfil, for instance. We would also need the backing of the EU, and the initiative would require a change in Danish legislation,” adds Søren Troels Berg.

He goes on to explain that the requirement for garbage trucks arose from the 2006 report from the Danish Road Traffic Accident Investigation Board, which triggered a wide range of measures.

“We’ve introduced a lot of staggered stop lines, and in 2009–2011 we altered a number of intersections, using signals and lane markings to separate the traffic flows. We saw the issue of the garbage trucks as a side benefit. It was there for the taking,” says Søren Troels Berg.

The Danish Transport and Logistics Association (DTL): Goods carriers are keen to invest in safety

Frank Davidsen, Vice President of the Danish Transport and Logistics Association (DTL), welcomes the idea of requirements on lorries in big cities.

“If the customers are willing to pay for it, goods carriers are ready to make the investment. They just need time to phase out the old material. The more people who demand it, the better suppliers can provide it,” he says.

Frank Davidsen believes that there are some obstacles to overcome as regards the demand for road-safe lorries, however. They relate to different types of lorries.

Some transport assignments demand lorries with big engines, which rules out low-sitting cabs positioned in front of the wheels, and more glass sections.

“Take the extensive subway construction in Copenhagen, for example, where every lorry is moving over 30 tons of soil and building materials. This requires lorries with engines of 500 hp or more – and correspondingly large radiators in the front. This means that the driver will have to sit high because of the design of the vehicle itself,” relates Frank Davidsen.

