

Every Accident is One Too Many

Road safety starts with you



Towards new objectives 2001-2012

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Towards new objectives



Think of 'Parken', the Copenhagen Stadium, when a World Cup football match is being played. Every last seat is filled. More than 45,000 men, women, and children.

This is the number of people that will be killed or seriously injured in Danish traffic during the decade to come - unless we take new and vigorous measures.

In 1998, the Danish Road Safety Commission resolved that the number of people killed and injured in traffic must be reduced by at least 40 per cent before the end of 2000.

Now, at the end of this period, it appears that the actual reduction was almost 30 per cent. This is to say that we did not fully achieve our objective. We got far...but nowhere near far enough. Think of Parken.

Experience gathered from the old action plan tells us that ambitious goals and common plans featuring many initiatives are effective and do save lives.

The Road Safety Commission is now setting new, specific targets. The objective is to have no more than 300 deaths and 2,443 seriously injured people in Danish traffic per year by the end of 2012. These figures correspond to a 40 per cent reduction in current levels.

These objectives can be fulfilled. United Kingdom has approximately 40 per cent fewer deaths on the roads per inhabitant than Denmark. Why shouldn't we match this?

With the new objectives for road safety laid down by the Road Safety Commission, it is no longer sufficient to simply continue our efforts at the same level and using the same measures as before. New, more effective measures are needed, and these measures are suggested in this action plan.

Active participation is required from everyone if these objectives are to become reality. This is true for the Danish state, counties, and local authorities, and for all public and private enterprises. Most of all, it is true for all road users, for you and me. The Road Safety Commission has set a target and prepared a plan. Please take up this challenge.

Remember: Every accident is one too many - Road safety starts with you.

A handwritten signature in blue ink that reads "Helge Adam Møller". The signature is stylized and includes a long, sweeping flourish that extends to the right.

Helge Adam Møller
Chairman of the Road Safety Commission

The Road Safety Commission

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Summary

The Road Safety Commission's new national objectives for road safety - *'Every accident is one too many - Road safety starts with you'* - replaces the 1988 Action Plan.

The new objectives represent a desire to develop an overall, common vision for Danish road safety efforts, as well as a desire to set a total national target for a reduction in the number of road accidents.

The Vision: *'Every accident is one too many'*

The vision entitled *'Every accident is one too many'* was launched in the Danish Government's Action Plan on road safety. It is to constitute the common overall vision for all stakeholders and players within Danish road safety. This vision sets a course towards a future road system without any road accidents whatsoever and retains focus on preventive measures. Thus, the objective of all initiatives will be to prevent road accidents.

The vision makes demands on national and local authorities, enterprise management and employees, as well as individual road users. At the same time, it is necessary to discuss a redistribution of responsibilities and roles - both for road users and for those stakeholders and players who design and operate our road and traffic systems.

This vision means that all authorities - national and local - are under an obligation to do their level best in all planning, design, construction, and maintenance of traffic facilities to prevent road accidents.

Objectives for road safety in Denmark

The number of people killed or seriously injured on Danish roads must be reduced by at least 40 per cent during the

next twelve years. The basis for calculations is 1998 statistics. This is to say that in 2012, the number of persons killed in traffic must not exceed 300, and the number of serious injuries must not exceed 2,443.

In these objectives, emphasis is placed on those killed and severely injured. This represents a change in relation to previous declarations of intent, as the Road Safety Commission considers that, in view of current accident statistics, every effort must be made during the next twelve years to reduce the number of serious road accidents. This does not mean that measures directed against less serious accidents will be forgotten. Indeed, it is often the case that the instruments and tools needed to reduce the number of serious accidents have a knock-on effect on less serious incidents.

The objectives are deemed ambitious, yet realistic. Indeed, Sweden - and to a certain extent United Kingdom and Norway - boast a level of road deaths per inhabitant which is approximately 40 per cent lower than ours. Not only does Denmark have more deaths in road accidents per inhabitant than Norway and Sweden, we also lose more man-years to road accidents, as more children, young people, and young road users are killed in Denmark than in our Scandinavian sister countries.

The objectives are to be met irrespective of any growth in traffic and for all groups of road users. When evaluating the efforts made, however, the Road Safety Commission will place particular emphasis on those groups of road users who remain at high risk: cyclists, pedestrians, and children/young people.

The Road Safety Commission

The Road Safety Commission was established by the Ministry of Transport and is composed of members of parliament, representatives from ministries, counties, local authorities, and institutions with interests in road safety. The task of the Road Safety Commission is to propose road safety initiatives to reduce the number of road accidents.

The Road Safety Commission shall:

- Set the overall central goals for road safety initiatives that can act as signposts for efforts from other parties.
- Inspire interested parties to enhance their efforts, and new players to implement initiatives to promote road safety.
- Monitor closely nationwide developments in accidents and carry out regular assessments of road safety with a view to identifying where there are needs for stronger initiatives.
- Identify new areas requiring initiatives.

Figur 1. Compositions and tasks of the Road Safety Commission

Strategies for road safety initiatives

Future initiatives on road safety are to be based on the following strategies:

- Road safety starts with you
- Private and public sector efforts
- Four central and visible key areas: speeding, alcohol, cyclists, and junctions
- Local road safety efforts must be strengthened
- New knowledge on road safety.

Road safety starts with you

The behaviour of individual road users is a decisive factor in most road accidents. If all drivers followed these three golden rules: observe the speed limit, fasten your seatbelt, never drink and drive, we would experience an immediate reduction in the number of deaths in road accidents of at least 40 per cent - corresponding to the Road Safety Commission objective for 2012. This is why the Road Safety Commission calls for greater efforts to change road user behaviour within the three areas outlined above.

This entails allocation of more funds to more intensive national campaigns for road safety. Such campaigns must be forceful, direct, target specific, and systematic, and they must be repeated regularly - partly because the target group changes continually. Electronic media should also be used to a much greater extent than at present to communicate messages regarding individual road user behaviour.

The Road Safety Commission holds that there is a need to create public appreciation and understanding for the fact that the speed limits must be observed. If the current experiments on automatic speed checks prove positive, the Road Safety Commission recommends a nationwide introduction of automatic speed checks. In order to obtain public support for such a scheme, it should be considered whether the fines collected from automated speed checks could be used to finance local measures to promote road safety.

Campaign efforts to promote the use of seatbelts must be intensified. Campaigns must include information as well as police follow-up. In connection with such campaigns, the Commission points to the need for a substantial increase in present fine levels for driving without wearing seatbelts.

Efforts to bring about a general change in the Danes' attitude towards drink-driving have met with success; drink-driving is no longer considered acceptable behaviour. This shift in attitude must be retained, and new efforts must be directed at those who continue to drink and drive, e.g. road users with drinking problems.

Intensified efforts are also needed for specific groups. This

applies to e.g. young men between the ages of 18 and 24, as this particular group of road users are grossly overrepresented in accident statistics. A points system for driving licence holders could have an effect on road safety in general and on accident rates for 18-24 year olds in particular.

Private and public sector efforts

Organised transport constitutes a substantial part of Danish traffic, and consequently all enterprises have a special responsibility to help improve road safety. Agreements between private and public enterprises, employees, and transport service suppliers present great potential for accident prevention. Moreover, those who purchase transport services should also place demands on transport enterprises for road safety in all transport. Public enterprises have a special responsibility to take the lead as regards the preparation of enterprise plans on road safety and the creation of demand for safe transport.

Local road safety efforts must be strengthened

The new objectives include a number of suggestions and recommendations for local road safety efforts. The Commission recommends that great emphasis be placed on local commitment to road safety. Almost 60 per cent of all injuries occur on municipal roads, and a large portion of the financial burden created by road accidents rests with counties and local authorities.

Road safety must be an integral element in overall physical planning, e.g. when deciding on the location and planning of school districts, the location of transport intensive enterprises, and the layout of new residential areas. New facilities and changes to existing structures should be subject to road safety audits during the planning stages.

Local authorities and counties should motivate local citizens to make local efforts to improve road safety themselves. Recommendations include the establishment of local road safety committees in local authorities and counties.

Four central and visible key areas: speeding, alcohol, cyclists, and junctions

Approximately 85 per cent of all road accidents involve one or more of these four elements: speeding, alcohol, cyclists, or junctions. The Road Safety Commission recommends continual emphasis on these focus areas. Greater efforts within these areas are crucial to success in meeting the objectives, and the Road Safety Commission proposes a number of specific measures with particular emphasis on these focus areas.

New knowledge on road safety

An accident commission for road accidents is to be set up in order to obtain more detailed and systematic knowledge on the causes and circumstances of various types of road accident. This will provide a good basis for carefully applied preventive measures.

The Commission proposes intensified efforts within research and development, and indicates three specific areas where more knowledge is required:

- 1) Causes of accidents and perception of risk, road user behaviour, and effects of initiatives.
- 2) Models for carrying out comprehensive analyses of the relationships between road safety and environmental issues, urban development, public health, and other themes where interplay is important.
- 3) The development of tools for prioritising and evaluation. Such tools are to be used for identification of the most effective measures, ongoing evaluation of accident rates, and evaluation of the measures taken and efforts made so far.



Every accident is one too many

The vision *'Every accident is one too many'* sees the Road Safety Commission setting a course for a future traffic system without any road accidents whatsoever

Accidents involving a risk of serious injury are not accepted within society in general. For example, such zero tolerance applies to industrial injuries, where deaths and permanent injury are considered unacceptable.

Similarly, the Road Safety Commission does not wish to see road accidents being accepted as a necessary evil; a burden which our society must bear to maintain our present economic, social, and commercial rate of development. Quite the opposite holds true; road accidents are a problem which society as a whole must constantly strive to counteract in better, more effective ways.

The vision *'Every accident is one too many'* was inspired by the Swedish 'zero vision', where the long-term objective is to prevent road accidents from causing serious injury or death. Man will always make mistakes - including deliberate mistakes - in traffic. The object is to control the consequences of such mistakes. This is the central concept of the Swedish zero vision.

The vision *'Every accident is one too many'* retains focus on preventive measures. There is still plenty of scope for new measures within road user awareness/training and road improvement to help avoid road accidents.

The road safety issue can be described in the following terms:

- The number of mistakes and violations made on the roads and the consequences thereof,
- The seriousness and nature of injuries sustained by individual persons as a result of such mistakes or choices, and individual tolerance of such injuries,
- The quality and availability of first aid, health care, and rehabilitation.

Together, these parameters result in an almost predestined number of deaths and injuries. All three levels should be targeted en route to fulfil the vision 'Every accident is one too many'.

The number of mistakes and violations made on the roads and the consequences thereof

The following options/measures may be utilised to prevent human error or poor choices:

- Development of safe and secure road and traffic systems, as well as systems which are more specifically

adapted to reflect individual road users' opportunities for safe transport. For example, this may be carried out by separating pedestrians, cyclists, and cars, or by ensuring very low speeds where various types of road users need to share a given space.

- Improvements in general training and information on safe behaviour and risks in traffic. Many road users do not know the real risk involved in various patterns of traffic behaviour. Greater knowledge and awareness of these issues will cause road users to take a more active part in efforts to avoid accidents altogether.

The seriousness and nature of injuries sustained by individual persons as a result of such mistakes or choices, and individual tolerance of such injuries

The following steps may be taken to limit the impact of accidents.

- Adaptation of speed limits to avoid serious accidents. Calculations show that the approach speed at the moment of collision cannot exceed 60-70 km/hr without subjecting drivers and passengers to great risks of death or serious injury. This example applies only to relatively new cars with modern safety equipment. Pedestrians and





cyclists do not enjoy the protection afforded to those seated in cars. The approach speed in any collision between cars and 'soft' road users cannot exceed 30-40 km/hr if pedestrians/cyclists are to have a good chance of survival. Where greater speed is required, the long-term objective must be to change/construct roads with a view to avoiding collisions altogether.

- Development and improvement of passive safety in cars, including crumple zones and airbags, as well as greater use of seatbelts and cycling helmets.

The quality and availability of first-aid, health care, and rehabilitation

The following are examples of steps which may be taken to optimise first aid and emergency care:

- Improvements to emergency services
- Development of emergency efforts, directly at the scene

of the accident and at the hospital

- Improvements to long-term care and rehabilitation for victims of road accidents

Redistribution of responsibilities and roles

Today, road users are usually held responsible for road accidents. As we recognise that road users will continue to make mistakes and deliberate transgressions, it becomes necessary to discuss new areas of responsibility and roles for those stakeholders and players who design, construct, and operate road and traffic systems.

The objective must be to have our road and traffic systems designed and constructed in a manner which prevents serious accidents. Such an objective has an impact on road construction, legislation, car design, etc.

Road builders must design roads to ensure that road users travel at appropriate speeds for the function of the road and the composition of traffic. Similarly, car designers should equip all cars with seatbelts, airbags, and crumple zones and design systems to ensure that drivers and passengers do, in fact, use such safety equipment.

All road users must observe the rules adopted by our legislators. But when road users ignore these rules - either through ignorance or lack of skill or as deliberate offences - this must be taken into account in all planning and design in order to prevent people from getting killed or suffering serious injuries.

When the road safety vision is completely implemented, it will provide all road users with a very high degree of security against road accidents.

Utopia or realism?

To effect a transition from our present day traffic system with approximately 500 deaths and 4,000 serious injured a

year to a system with no road accidents whatsoever would seem to be completely daunting and unrealistic.

However, the Road Safety Commission considers that within the space of a generation or two, we will be able to make very good progress towards realising this vision.

In all likelihood, the future will hold far greater requirements as regards safety and the environment in urban areas, as well as greater support for low speed levels in areas where cars mix with pedestrians and cyclists.

On the main road systems with high speed levels, intelligent systems will help to get road users safely to their destinations to a much higher degree than today.



Towards new objectives

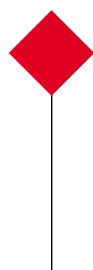
The Road Safety Commission has decided to set new targets for road safety in the first twelve years of the new century. These objectives are to serve as inspiration to the many stakeholders and players operating within road safety.

The Road Safety Commission sets the stage for having individual road users assume a very central role in future road safety efforts, as it is the interplay between roads and bicycle paths, vehicles, and especially road user behaviour that determines the number of accidents and their nature.

The Road Safety Commission will work to have individual road users become a much more active element in overall road safety efforts. This will be done through dialogue between citizens and local authorities, counties, the police, and ministries, as well as by preparing enterprise action plans for road safety and by increasing collaboration with interest groups/organisations.

Specific targets for road safety efforts 2001-2012

As we work our way towards realising the vision 'Every accident is one too many', the Road Safety Commission has identified the following specific target - an ambitious, yet realistic objective:



The number of deaths and seriously injured on Danish roads must be reduced by at least 40 per cent by the end of 2012 when compared to 1998 statistics. This is to say that by 2012, the number of deaths on Danish roads must not exceed 300 and the corresponding number of serious injuries must not exceed 2,443.

Whereas the previous targets set by the Road Safety Commission included deaths and all injuries on Danish roads, these new objectives concern only deaths and serious injuries. This new focus reflects a desire to prioritise the efforts made and to make them more target specific. This is not to say that the next twelve years will not feature any effort to reduce the number of accidents resulting in minor injuries, as a great many of those initiatives aiming to reduce the number of serious accidents will have a knock-on effect on less serious accidents as well.

The target specifying a 40 per cent reduction in the number of deaths and serious injuries must be met regardless of any growth in road use and road safety efforts. The

consequences of increasing car traffic in terms of greater risk of accidents can and will be counteracted through initiatives to curtail traffic growth as well as intensified efforts to promote road safety.

Our specific target is based on the accident statistics for a single base year - 1998. However, for most local authorities, accident statistics from just one year will constitute a very slim basis for establishing target figures. As a result, the Road Safety Commission proposes that local authorities should calculate their target figures on the basis of an average of local accident statistics for several years when identifying local targets. For example, this might be the average accident statistics for 1997, 1998, and 1999.

The target period has been set at twelve years to ensure that all local authorities and counties have enough time to carry out thorough local discussions on accident trends, get an overview of any specific types of accidents which merit special attention, determine their target figures, adopt the necessary initiatives, and to implement and assess the various efforts and activities.

The Road Safety Commission wishes to point specifically to the need for intensified efforts directed at those groups of road users who continue to be at high risk on Danish roads: pedestrians, cyclists, and children and young people. The final assessment and evaluation of the results achieved will have an especial focus on accident trends within these groups.

Overall strategies

The Road Safety Commission proposes five overall strategies as the basis for road safety efforts in Denmark during the first four years of the new target period:

- All stakeholders and players within road safety must work actively to involve individual road users in road safety efforts under the heading 'Road safety starts with you'.
- Private and public enterprises are called upon to prepare special enterprise plans for road safety and to enter into agreements with their employees and suppliers to reduce the number of road accidents.

- Local authorities, counties, and local road safety committees are encouraged to adopt the vision 'Every accident is one too many' and to use this vision when preparing action plans on road safety and carrying out specific and concrete efforts to promote road safety on the basis of their own problems, needs, and resources.
- Road safety efforts are to concentrate on four central and highly visible key areas: accidents involving speeding, accidents involving drivers under the influence of alcohol, accidents involving cyclists, and accidents at road junctions.
- Research, development and accumulation of knowledge on road safety and road user behaviour - including choice of transportation - must be promoted and intensified. This is particularly important in terms of identifying the opportunities offered to road safety in Denmark by new intelligent road and vehicle systems.

Background

In 1988, the Road Safety Commission issued the Action Plan for Road Safety, also known as the 'green' recommendations. This action plan helped to set the agenda for road safety efforts in Denmark throughout the 1990s.

The action plan set the overall target that the number of deaths and injuries on Danish roads was to be reduced by at least 40 per cent by the end of 2000 when compared to the basis year, which was the average statistics for 1986/87 (711 deaths, 12.707 injuries). These targets meant that

by the end of 2000, the corresponding figures were not to exceed 427 deaths and 7,624 injuries.

In 1998, a total of 499 people were killed on Danish roads, a figure which corresponds to a reduction of approximately 30 per cent when compared to 1986/87 statistics. The number of injuries dropped by approximately 28 per cent during the same period.

The preliminary figures for 1999 are not significantly different from the 1998 accident statistics. This is to say that there are many indications that we will have achieved a reduction of approximately 30 per cent in the number of deaths and injuries as the first action plan period expires.

The Road Safety Commission action plan has served as a source of inspiration to all who work to promote road safety in Denmark - ministries, directorates, and agencies; counties and local authorities; the police; and various organisations.

When the accident rates on Danish roads began to increase again in the mid-1990s, the Road Safety Commission issued the Strategy Plan 1995-2000, which called upon all stakeholders and players to prepare action plans for road safety. Many local authorities and counties took up this challenge. All counties and more than half of all Danish local authorities have established specific targets for road safety and prepared road safety action plans.

Years lost before the age of 75, by gender and cause of death - Denmark, 1996

Cause of death	Years lost	
	Men	Women
Ischaemic heart disease ¹	24.500	8.300
Lung cancer	14.200	11.200
Suicide	15.100	5.300
Road accidents	13.200	3.900
Accidents at home, etc.	11.400	3.400
Breast cancer		13.100
Cirrhosis of the liver	8.500	3.700
Bronchitis	4.700	6.200

¹ Heart disease due to reduced distribution of blood and oxygen to heart musculature

Source: The Danish Government's Public Health Programme 1999-2008

Figure 2: Years lost before the age of 75 in Denmark, 1996

The Government also answered the Road Safety Commission's call, e.g. by preparing the 1997 action plan *'Every accident is one to many'*. This action plan was the first document in Denmark to formulate the vision that road accidents are unacceptable.

This overall vision has full support from the Road Safety Commission.

Road safety is one of the five main themes of the Government's Public Health Programme. Road accidents represent one of the crucial factors serving to reduce mean life expectancy in Denmark, as they often involve children and young people.

Road accidents come fourth on a listing of the most frequent causes for loss of life before the age of 75 in Denmark. This is to say that improved road safety and a significant reduction in the number of fatal road accidents are important focus areas in efforts to increase mean life expectancy in Denmark.

Denmark has significantly more fatal road accidents than those countries usually used for comparison, and we lose more 'man-years' to road accidents. In Denmark, more than 9 out of 100,000 inhabitants are killed on the roads,

whereas the corresponding figures for Sweden, Norway, and United Kingdom are 6 to 7 per 100,000 inhabitants.

Thus, the desired reduction of at least 40 per cent in the number of deaths and serious injuries during the next twelve years must be seen in the context of the trends for road fatalities in those countries normally used for comparison. What can be done in Sweden, Norway and United Kingdom should certainly be possible in Denmark as well. Even in the Netherlands, where the population density is greater and the available space correspondingly smaller, they have managed to organise traffic in a way that gives rise to significantly fewer deaths.

Danish traffic is increasing. For example, car transport went up by 2.5 per cent in 1998. During the period from 1980 to 1998, total road use went up by 80 per cent. All else being equal, more car traffic entails a risk of more road accidents.

The fact that this increase in car traffic has actually taken place at the same time as the number of deaths and injuries on Danish roads has fallen can largely be attributed to the efforts made during this period to improve road safety. These improvements include new road design and construction, safer car design, measures targeted at road user behaviour, more checks and control, etc.

It is also significant in this context that the greatest increase in traffic has occurred on the main road network - the larger roads. This road network includes the safest roads - such as the motorways - and we know from accident statistics that when more traffic is added to a crowded road, accident rates do not go up at the same rate.

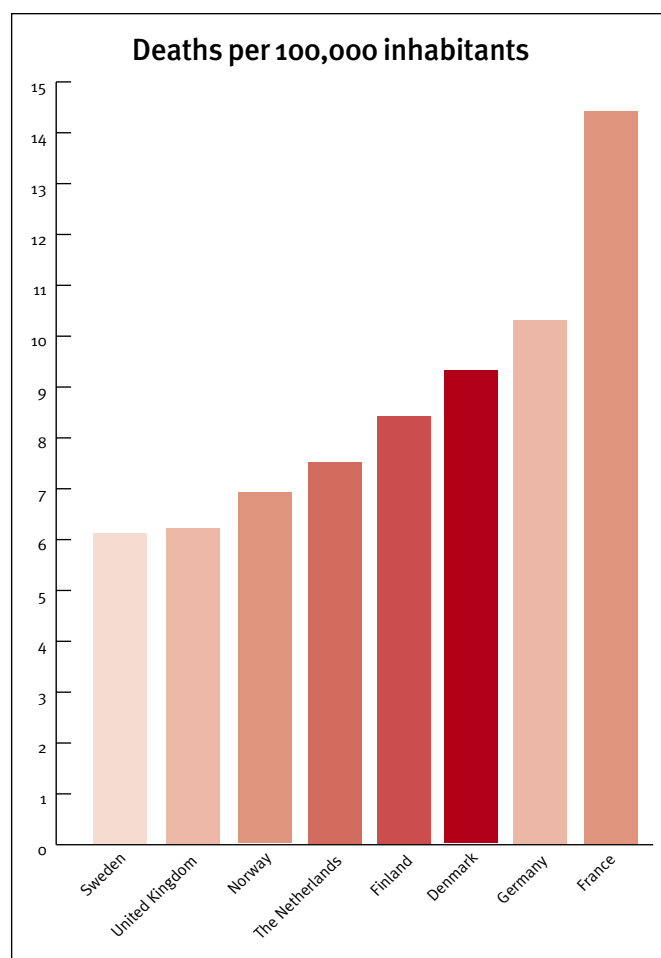


Figure 3. The number of deaths on the roads per inhabitant in various countries



Making the vision come true

Road safety is becoming increasingly complex. New results from research on new initiatives continue to arrive, and the most effective among the best-known solutions have already been fully exploited.

For example, the traditional efforts at 'black spots' are very different today from when the Road Safety Commission published its last action plan in 1988. The main road network has been systematically combed to eliminate the worst black spots, and the same applies to many major municipal roads. Today, black spots normally have more complex accident patterns, and even though the benefits from efforts continue to be significant, the effects are no longer as pronounced as they were 10 - 15 years ago.

This greater complexity is also evident in the fact that the number of initiatives recommended by the Road Safety Commission today is approximately twice the corresponding 1988 figure.

This does not mean that all solutions should be carried out as individual, autonomous projects. The Road Safety Commission recommends that the stakeholders and players within road safety should join forces and create holistic solutions where individual projects and activities offer mutual support.

For example, there should be cohesion between road design, information for road users, and police initiatives.

62 initiatives to improve road safety

The Road Safety Commission proposes a total of 62 initiatives to reach the final objective. The Commission finds that all of these initiatives can help bring about the desired reduction in the number of deaths and injuries on Danish roads.

At the same time, the Commission is aware that the issue of implementation of individual initiatives must be considered in a wider political and socioeconomic context. For example, a number of these initiatives require substantial increases in present funding levels.

Based on existing knowledge on road safety, complete implementation of all 62 initiatives during the next twelve years will make it possible to achieve the Road Safety Commission's objective and to reduce the number of deaths and serious injuries by at least 40 per cent.

Socioeconomic costs

Calculations of the economic consequences of the Road Safety Commission's new objectives can be carried out in several different ways. Looking at the socio-economic

costs is the method most frequently used in connection with large-scale public investments. With this method, the money saved by reducing the number of road accidents is calculated when making investments in road safety.

The Danish Road Directorate has calculated the socioeconomic costs of road accidents at DKK 11.3 billion - not including additional welfare expenditure. The costs per registered personal injury are as follows:

- Injuryrelated costs (treatment, care, etc.) DKK 493,000
- Material damage DKK 594,000
- Total (not including welfare loss) DKK 1,087,000

At the launch of this plan, the number of personal injuries and deaths on Danish roads per year is 9,674 (1998). With a projected growth in general traffic of approximately 1.6 per cent a year, this figure will grow to approximately 11,000 in 2012 unless preventive road safety efforts are carried out. If all the initiatives proposed by the Road Safety Commission are implemented, the number of deaths and injuries will drop to 5,800.

During the total twelve year period from 2001 to 2012, implementation of the total plan prepared by the Road Safety Commission will reduce the number of personal injuries by approximately 31,000. This equals a DKK 34 billion reduction in expenditure on treatment, care, and material damage. Additional savings amounting to DKK 11 billion in welfare loss bring the total savings up to DKK 45 billion.

Investment and operation of the initiatives proposed will cost approximately DKK 12 billion for the entire period.

Public expenditure caused by road accidents

A different approach to the economic consequences of the action plan is to specifically address the costs and revenues for local authorities, counties, and the state. The Danish Road Directorate has calculated that public expenditure on road accidents and their consequences is DKK 2.14 billion. This expenditure is distributed as follows:

Local authorities	DKK 846 million
Counties	DKK 962 million
Central Government	DKK 330 million
<hr/>	
Total:	DKK 2,140 million

Each personal injury costs the public purse approximately DKK 250,000 (1999). These costs are distributed as follows:

Local authorities	DKK 100,000 (40 per cent)
Counties	DKK 112,000 (45 per cent)
Central Government	DKK 38,000 (15 per cent)

Total:	DKK 250,000
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The total savings to the public purse for the entire period will be DKK 7.8 billion. These savings will be distributed as follows:

Local authorities	DKK 3.1 billion
Counties	DKK 3.5 billion
Central Government	DKK 1.2 billion

Total:	DKK 7.8 billion
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This clearly shows that efforts to prevent the pain and grief associated with every single road accident also save money, thus providing an added financial incentive to intensify road safety efforts.

Wide range of initiatives

General road safety efforts will employ a wide range of initiatives, including information, campaigns, road improvement, better legislation, control measures, and research to improve our general knowledge and basis for decision making.

The Road Safety Commission wishes to stress the need for better cooperation and closer coordination in the various initiatives. Such closer collaboration is a crucial precondition for ensuring a reduction in the number of people killed and seriously injured on Danish roads.

In order to work towards the realisation of the vision 'Every accident is one too many', strong and close-knit interplay between road users and the many players within road safety is required.

The preconditions for reaching the objective are:

- Road users must change their behaviour
- Initiatives targeted at high risk road users must be intensified
- Enterprises must take direct action to promote road safety
- Road safety must be an integral element in all physical planning
- Vehicles must have better safety equipment
- Local road safety must be emphasised within counties and local authorities
- Central government activities on road safety must be enhanced

Road users must change their behaviour

The vast majority of all road accidents can be directly

linked to individual road user behaviour. For example speeding, drink-driving, inattention, failure to give way, or jumping traffic lights. Danish and international accident analyses show that accident factors can largely be attributed to individual road user behaviour - including a lack of awareness that other road users might perform unexpected and illegal manoeuvres. The accidents examined could either have been avoided altogether or rendered considerably less serious.

The central significance of individual driver behaviour can be illustrated by the following example: If all Danish drivers would follow three golden rules of traffic behaviour, we would immediately see a reduction in the number of fatal road accidents of at least 40 per cent - corresponding to the Road Safety Commission objective for 2012.

Golden rules for road user behaviour

- Always observe the speed limit
- Always wear your seatbelt
- Never drink and drive

Figure 4. Golden rules for driver behaviour

It is not an easy task to make people change their behaviour, habits, routines, and attitudes, but it can be done through a wide range of initiatives such as information, campaigns, legislation, control, and road engineering.

Within one particular area, it has already been proven that it is indeed possible to change road users' attitudes and behaviour to improve road safety. Today, drink-driving is no longer socially acceptable - the attitude towards mixing alcohol and driving has changed during the last ten to twenty years. This has yielded direct results: a significant drop in the number of drink-driving accidents by more than 40 per cent in the ten years from 1988 to 1998.

Future efforts to promote road safety must be based on the positive results from the drink-driving campaigns. The extensive, nationwide information and campaign efforts stimulated a direct dialogue with road users within the target group and were combined with efficient, nationwide police checks. This approach has proven very effective.

In order to get in touch with road users with risky behaviour on the roads, we need long-term information and campaign efforts. This requires systematic and periodic surveys of road user behaviour as regards e.g. seatbelts, the use of hand-held mobile phones while driving, use of cycling helmets, compliance with speed limits, and road user attitudes towards such issues.



The Road Safety Commission points to the crucial need for changing risky behavioural patterns on Danish roads. This may be done e.g. through new ways of engaging road users in dialogue, or through combinations of tried and tested methods. The Road Safety Commission particularly

wishes to emphasise the following three areas where road users need to be responsible and change their behaviour: speeding, drink-driving, and driving without a seatbelt.

The Road Safety Commission points to the fact that individual road user responsibility and opportunities for helping to improve road safety through personal behaviour must be communicated by means of the most effective media. This is to say that electronic media such as television and the Internet must be increasingly incorporated in awareness-raising campaigns. Consequently, the Road Safety Commission proposes that more resources be allocated in future to preparing special efforts targeted at electronic media with messages concerning the importance of individual road user behaviour.

Finally, the Road Safety Commission calls on road user organisations and other private organisations to accept a central role as regards influencing individual road user behaviour and responsibility for avoiding accidents.

that it be considered whether the fines collected from such automatic speed checks could be used to finance local road safety initiatives. The specific outline of such a scheme should be discussed with relevant local stakeholders and players, such as local authorities, counties, and the police, before a final decision is made.

Risk of accident when speeding/drinking and driving

It is important that road users know and respond to the increased risks linked with speeding. An Australian study by researchers at the University of Adelaide shows that the risk of becoming involved in a road accident is equally great in the following situations:

1. Driving at 20 km/hr in excess of the 60 km/hr speed limit
2. Driving with a blood/alcohol level of 2.1 o/oo

In both cases, the risk of personal injury is increased by a factor of approximately 30.

Speed

The correlation between speed and accidents is very well documented. Greater speed means greater risk of accident - and if an accident does happen, greater speed means more - and more serious - personal injuries.

A five per cent drop in average speeds would typically entail a drop in the number of serious personal injuries by between 10 and 15 per cent. The number of deaths would drop by more than 20 per cent.

In urban traffic, a five per cent drop corresponds to a drop in average speeds from 51.5 km/hr to 49 km/hr.

Thus, increased efforts from the police and road authorities to reduce speeds would yield very significant results.



The Road Safety Commission recommends the allocation of the necessary funds to establish a nationwide system of automated speed checks, if the current experiments prove successful. Especially on roads or in areas where road accidents are frequent, road safety would benefit from nationwide automated speed checks.

In order to increase public support for nationwide automated speed checks, the Road Safety Commission recommends

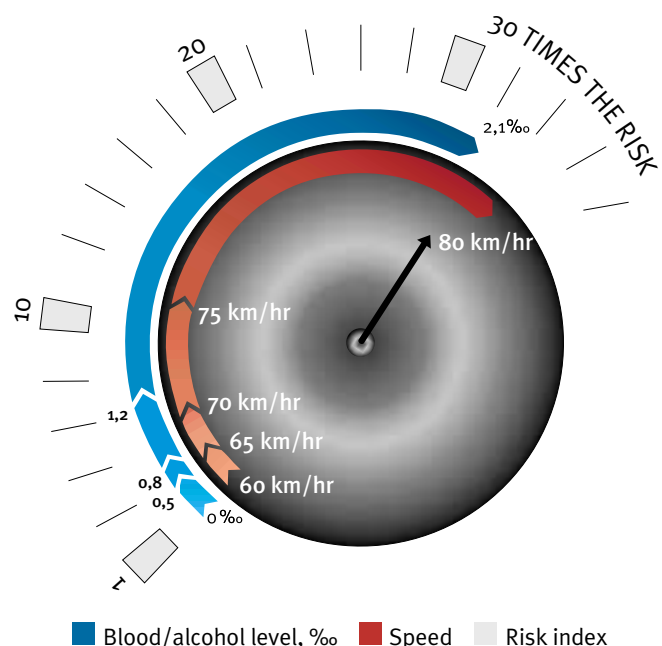


Figure 5. Correlation between speed and drink-driving. The risk is set at 1 at a blood/alcohol level of 0 and an average speed of 60 km/hr (corresponding to the 60 km/hr speed limit in Adelaide, Australia)

Drink-driving

The last ten years have shown a very positive trend as regards the number of road accidents involving drivers under the influence of alcohol. The drop in the number of drink-driving accidents has been significantly greater than the average drop for all accident types.

Despite this drop, however, alcohol continues to be involved in one in four fatal road accidents. Accident statistics for recent years show that the previous pronounced drop in the number of accidents involving young, male drivers under the influence of alcohol has now levelled out or is rising slightly.

This means that concerted efforts to prevent drink-driving are still needed.



The Road Safety Commission proposes intensified police efforts targeted at drink-driving.

The Road Safety Commission calls on all counties to carry out annual 'Say No' campaigns to create a high-profile, nationwide effort directed against drink-driving among young people.

Finally, the Commission finds that there is a need for special measures directed against drivers who are repeatedly apprehended for drink-driving. As part of such efforts, the Commission includes a proposal to carry out experiments with car immobilisers which are deactivated by successful alcohol testing.

Seatbelts

Today, we know that seatbelts save lives. Calculations show that if all drivers/passengers had fastened their seatbelts in 1993 and 1994, 100 lives would have been saved.

Parents are not very good at ensuring the safety of their children. In connection with a 1999 'Back to School' campaign, the police reported 522 mothers and fathers for not ensuring their children's safety by fastening their seatbelts.



The Road Safety Commission considers that there is a need for a national survey of the number of drivers who do not fasten their seatbelts. The results of such a survey are to be used as the basis for target specific campaigns and awareness-raising measures, as well as for control measures to increase seatbelt wearing.

As a first step towards a more long-term strategy for changing road user behaviour,

the Road Safety Commission calls for funding of a nationwide, aggressive, extensive and intensive campaign in conjunction with intensified control measures to promote use of seatbelts. The objective will be to effect a marked increase in the number of road users fastening their seatbelts.

In addition to this, the Road Safety Commission proposes a large increase in fines for driving without a seatbelt.

Finally, the Road Safety Commission holds that it should be considered whether the exemptions from normal seat-belt regulations made for some occupational groups are still relevant today (e.g. the exemption made for taxi drivers when carrying passengers).

Intensified efforts for high-risk road users

On the basis of accident statistics, the Road Safety Commission has identified a number of risk groups within Danish traffic. Efforts aimed at these groups should be intensified and improved during the target period.

Children in traffic

Road accidents are one of the most frequent causes of deaths among children and young people. In 1998, 40 children and young people under the age of 18 were killed on Danish roads.

Road safety for children must be viewed as a whole, where parents, schools, institutions, and the children themselves must participate and be active.

Parents are responsible for teaching their children 'road manners' and how to respond to traffic, and as road users they are also responsible for the safety of all children, including their own.

Schools and institutions - including the boards of governors elected by parents - can help teach children how to behave in traffic in collaboration with parents. Such collaboration can also extend to school routes, choice of transport, use of safety equipment, and 'road manners'. The school materials prepared by the Danish Road Safety Council and the materials used in the Children's Traffic Club (a long-standing Council initiatives aimed at children from the age of three and up) can be used for such initiatives.



The Road Safety Commission proposes that the experiences from the Danish Road Safety Council's Road Safety Guide project should be used to spread the concept of road safety activities as a part of everyday life in daycare institutions and schools.

Road safety should be included in curricula at colleges of education, so that those who will later work with children are also aware of the need to address road safety in the classroom and elsewhere.

Finally, it should be considered what initiatives can help to persuade more parents to walk or cycle with their children to daycare centres and schools in order to practice road skills.

Accidents involving young drivers

Young men between the ages of 18 to 24 are grossly overrepresented in accident statistics. The risk of becoming involved in an accident is approximately 2.5 times higher within this age group when compared with all other male drivers. Many young men put themselves and others at inordinately high risk because they are not entirely familiar with the car and their own driving skills during the period immediately after getting their driving licence.

As of 1 July 1999, the Road Safety and Transport Agency introduced a compulsory minimum number of driving lessons for all learners. The objective is to ensure that all fledgling drivers have a minimum of driving experience before receiving their driving licence.

Experience from e.g. the county of Vejle in Jutland shows that it is possible to generate greater awareness of risky behaviour among young drivers.

It could have been a baby's pram...

This was the headline used for a project for young drivers held by the Prevention Committee of the County of Vejle in 1997. The objective of this project was to use various exercises to provide young people with 'oops! moments' when driving at motorway speeds, and so give them a real sense that higher speed equals less control of your car.

The project was designed to promote responsibility among young road users, so that they became aware of the risk of injuring other people on the road. The exercises took place at a sealed-off practise ground at the Vandel Air Base. The exercises were followed up by courses and lectures from invited guests - including ambulance crews, police officers, driving test examiners, young people who have themselves been involved in road accidents, etc.

Source: County of Vejle - The Prevention Committee

Figure 6. Pilot project for young people in Vejle County

The experience and knowledge available from the Danish Road Safety Council youth projects and from the information material on the curriculum at driving schools prepared

by the Danish Road Safety Council and the Road Safety and Transport Agency should be used to develop general information initiatives and awareness-raising measures.



The Road Safety Commission recommends that information and education measures to increase risk awareness be targeted specifically at young men.

The Road Safety Commission points to the need for examining the opportunities for establishing formal skill-raising courses/supplementary education on risk-conscious driving.

In addition to this, it should be considered whether there is a need to carry out other initiatives to promote and increase the quality of driving school teaching - including initiatives addressing the rules on driving instructors' training, their authorisation, and work.

The Road Safety Commission proposes to carry out studies to determine whether a points system for driving licences might help improve road safety in general - and young drivers' risk of accidents in particular. The idea is to have minor traffic offences registered as points on the driving licence, and when a specific number of points has been reached, the driving licence will be suspended for a period of time. It is recommended to have this proposal addressed by a working group under the Road Safety and Transport Agency when examining the opportunities for supplementary training for drivers.

Accidents involving the elderly

One of the main issues within road safety in future will certainly be how to prepare for a society with more and more elderly people on Danish roads. Particular attention must be paid to elderly drivers; the vast majority of elderly drivers do not constitute a danger, but we still experience some difficulty in identifying the small group of elderly drivers who may pose a hazard on the road, e.g. due to the onset of dementia, etc. A working group established at the instigation of the Road Safety Commission is expected to offer possible solutions for a revision of the compulsory medical examination in connection with licence renewal for 70-year old drivers.

There will, of course, also be far more elderly people among the 'soft' road users. A special campaign aimed at elderly cyclists should be prepared with a view to raising awareness of special risk factors for this particular group of road users.



The Road Safety Commission considers that the Danish traffic system should be prepared for a situation where far more elderly people will use our roads. As regards elderly pedestrians, there are opportunities for adapting traffic systems to take greater account of the reduced mobility which affects so many elderly people.

Measures such as road islands, longer periods of green light for pedestrians, etc., can be helpful to older pedestrians.

Moreover, target specific supplementary training and information campaigns should be aimed at elderly drivers, and it should be considered whether there is a need for new regulations on driving-licence renewal.

Enterprise plan for road safety

The Danish Road Directorate has approximately 530 employees and 130 vehicles at its disposal. In addition to transport in these vehicles, the Danish Road Directorate also generates job related driving in private cars and among its suppliers.

The objective of the enterprise plan is to plan the Directorate's activities in a way which prevents Directorate employees and employees with its suppliers from being exposed to a risk of personal injury while also minimising expenditure on accidents.

The road safety policy aimed at employees is divided into: information and training/education; discussion groups; safe vehicles and security equipment; safe cycling routes; accident training and first-aid training; central registration of vehicles and accidents. Finally the policy includes consequences for the staff, including sanctions against those who commit serious traffic offences or violations against the Directorate's traffic policies while at work.

The information and training policies take the following main messages as their point of departure.

- Reduce the number of kilometres travelled
- Observe all speed limits
- Fasten your seatbelt - wear a cycling helmet
- Check that the vehicle is safe
- Be committed to safe driving
- Be considerate towards your fellow road users

Source: The Danish Road Directorate

Figure 7: Example of an enterprise plan

Enterprise views on road safety

81 per cent of all major transport service buyers find that they themselves have an interest in having their transport carried out safely.

Only 6 per cent of these transport service buyers have special safety agreements with their own suppliers.

Source: Study prepared by the Danish Road Safety Council

Figure 8. Enterprise views on road safety

Organised transport

A very large part of all traffic on Danish roads is organised transport, i.e. transport which falls within the scope of agreements between employers and employees or enterprises and contractors. This means that focused efforts aimed directly at organised transport offer plenty of scope for improving road safety. As a result, the Road Safety Commission wishes to point to the special responsibility enterprises have to help improve road safety.

The responsibility held by individual road users has ample opportunity for becoming the object of debate when enterprise plans on road safety are prepared within public and private enterprises. It makes a difference when enterprises address road safety issues directly with their employees and suppliers, and this approach may well be more effective in promoting discussion than the more traditional public campaigns. Road safety can become a part of the enterprise culture and image, and this can contribute greatly to the total efforts made.

Heavy vehicles present a special problem in connection with road safety. In collaboration with the Road Safety and Transport Agency, the Danish Road Safety Council has run the campaign 'Safety through conversation', which was aimed at transport enterprises with heavy vehicles. Experience gathered from this campaign indicates a need for systematic road safety efforts at enterprises.

- Heavy vehicles are involved in approximately 20 per cent of all deaths in road accidents
- More than 20 per cent of all fatal industrial accidents occur on the roads

In collaboration with the Danish Ministry of Transport, the Danish Road Safety Council is carrying out development cooperation with a number of major public and private enterprises - the Danish Road Directorate, PostDenmark, the Danish National Railways Agency, DSB-Freight, and TDC - with the objective of preparing enterprise plans for road safety. In addition to this, the Danish Road Safety Council is using funding from the Traffic Pool to carry out a pilot project in collaboration with Renovadan and Arla Foods in order to examine how management tools can be developed for systematic efforts to promote road safety

within enterprises. Finally, several counties and local authorities have started work on road safety plans for county/municipal transport.



There is great potential for accident prevention in the agreements made between private and public enterprises, employees, and transport service providers. Consequently, the Commission calls for more trials and communication of results within this area.

The Road Safety Commission calls on both private and public enterprises to prepare road safety plans and to establish systematic safety efforts. Moreover, enterprises purchasing transport services should make specific road safety demands on suppliers. Public enterprises should lead the way and require safe transport services from their suppliers.

Such efforts could well make use of the Danish Road Safety Council's offer of consultancy assistance based on their experience from a pilot project on road safety within enterprises.

Closer contact and cooperation between transport service providers and buyers will promote safer and more efficient transport solutions. This is why the Road Safety Commission calls for the preparation of guidelines on how enterprises buying transport can make demands on their suppliers. Such guidelines should be prepared in collaboration between relevant parties such as DTL („Danish Transport and Logistics“), the Road Safety and Transport Agency, the Danish Road Directorate, the Danish Road Safety Council, representatives from counties and local authorities, etc. The guidelines should be designed for use by public as well as private enterprises.

The Road Safety Commission also urges public authorities, institutions, and agencies to lead the way by making demands on their transport providers for road safety. Increased demands for road safety within organised transport will help change behavioural patterns within the entire transport sector.

Road safety must be integrated into physical planning

Road safety should be an integral feature of all forms of physical planning: localising and planning of school

districts, siting of transport intensive enterprises, planning of new residential areas, infrastructure between cities, and much more.

What may seem an ideal solution to local education authorities could well cause problems for engineers and technical officials if the school districts are criss-crossed by heavily trafficked roads. Good footpaths, roads with low speeds and little traffic between home and school, daycare, or recreational facilities are important factors to most families with children.

Road safety should be a natural feature in the preliminary planning stages of all future construction works carried out by central government, counties, and local authorities. Overall planning and local road safety work could well involve local opportunities for influencing road user behaviour in connection with their choice of transportation so that such overall planning makes it easier for Danes to establish homes near their place of work. When sites are chosen for institutions, schools, recreational facilities, etc., one objective should be to have such institutions easily accessible without a car by as many people as possible.

Various ways of integrating road safety in planning and construction include preparation of road regulations that make road safety an integral part of road design as well as efforts to promote awareness and use of these road regulations.

Concerted efforts to promote road safety must also be carried out through quality assurance of new road projects. Relatively little additional expenditure would make it possible to achieve major benefits in terms of road safety if all major construction works were to be subjected to a safety assessment - a so-called 'road safety audit' - prior to implementation. The Danish Road Directorate has calculated that the extra cost of carrying out road safety audits, including subsequent re-planning, corresponds to an average of one per cent of the total construction costs, e.g. when constructing entirely new roads.

Road safety audit

A road safety audit is a systematic and independent assessment of road safety issues associated with road projects. The objective of such an audit is to make new and restructured road layouts as safe as possible before construction commences and before any accidents happen.



The Road Safety Commission calls on the central government, counties, and local authorities to incorporate a road safety audit in all planning of construction works on new or existing roads, and to ensure that all project budgets include funds for all measures necessary for road safety.

The Road Safety Commission proposes that road safety and opportunities for more desirable transportation choices should be accorded greater emphasis in local planning, municipal planning, regional planning, and sectoral planning. The principles developed in connection with road safety audits of new roads can be taken further and be used for initiatives such as local-plan assessment, and siting of residential areas, new enterprises, and school district plans.

Local road safety is to be prioritised in counties and local authorities

In order to obtain results which benefit road safety, it is necessary to have a number of different stakeholders and players make an effort to realise the common vision 'Every accident is one too many'. Such work should include individual road users as well as those who work professionally with road safety. It is important that every individual feels an interest in, and responsibility for, striving to make this common vision come true.

Various players contribute various tools and various approaches to the overall effort. Such diversity and a wide range of approaches to road safety are vital to our collective work to achieve continued reductions in the number of road accidents - and eventually realise the full vision.

Counties and local authorities are very significant players in everyday road safety efforts. Counties and local authorities are responsible for planning, constructing, operating, and maintaining the majority of Danish roads. Thus, counties are responsible for a total of approximately 10,000 kilometres of regional roads, while local authorities are responsible for approximately 60,000 km of municipal roads. In contrast, the Danish state authorities are only responsible for 1,600 km, of which about 800 km are motorways.

Even though less than a third of all road safety efforts are aimed at county roads, almost half of all deaths in road accidents occur on such roads.



A series of initiatives proposed in the new objectives require participation from counties and local authorities to become reality. First and foremost, the Road Safety Commission wishes to point to the crucial need for political action on local road safety within local authorities and counties through local road safety action plans.

Local road safety efforts - local commitment

Almost 60 per cent of all personal injuries on Danish roads occur on municipal roads, and the number of accidents on

such roads is rising. The fact that the Road Safety Commission recommends strong emphasis on local commitment to road safety is clearly a reflection of this fact. Local authorities and counties possess something absolutely vital to better road safety: local knowledge. Local authorities and counties know where school roads are dangerous, where views are obstructed, and where road users drive too fast.

Local authorities and counties have excellent opportunities for entering into direct dialogue with citizens, and experience from e.g. the preparation of local road safety action plans shows that Danish citizens' sense of responsibility for observing local speed limits, etc., is far greater if they have been involved in the efforts to prepare local road safety plans. Local residents also have valuable knowledge of spots on local roads where minor accidents are frequent - accidents which may not be registered with the police - and of places which they feel are unsafe.

A final important aspect of this issue is that counties and local authorities carry the vast majority of the economic burden of road accidents, such as hospital treatment, rehabilitation, social benefits, etc. Calculations made for the Danish Road Directorate show that counties pay 45 per cent of the total expenditure arising from road accidents, local authorities pay 40 per cent, and the state pays the remaining 15 per cent.

The Road Safety Commission calls on local authorities and counties to do more to motivate local citizens to make greater efforts to improve local road safety. Individual commitment to local road safety efforts can help develop excellent solutions to local safety problems. Such efforts can be carried out in collaboration with - or with support from - local road safety committees, relevant authorities, stakeholder organisations, etc.



The Road Safety Commission calls on all local authorities to adopt an action plan on road safety, if they have not already done so.

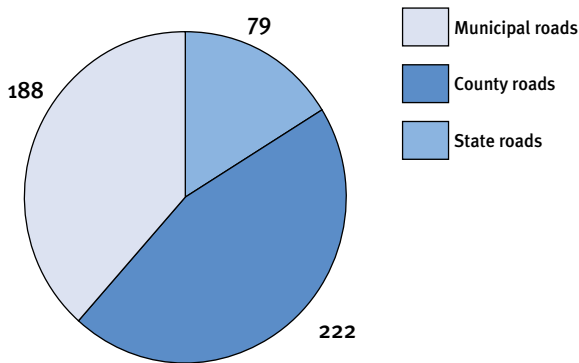
Action plans improve the basis for decision making and prioritisation, they generate greater awareness and local debate on road safety, and they create good frameworks for local people's participation and commitment. Local approaches towards information and campaign activities should be developed further during the years to come.

A local action plan:

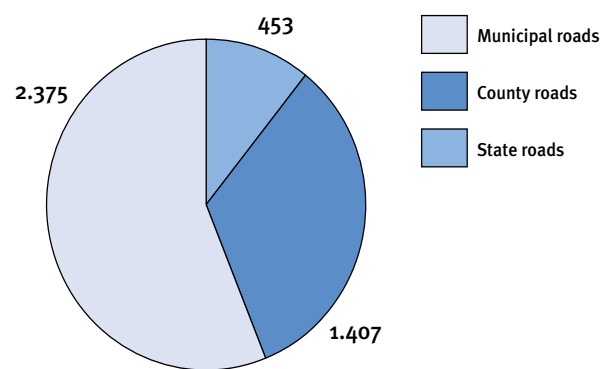
- Focuses municipal efforts to reduce the number of deaths in road accidents and injured
- Creates a basis for political decision making and resource allocation
- Increases public awareness of road safety issues
- Generates local debate on road safety

Figure 10. Local action plan

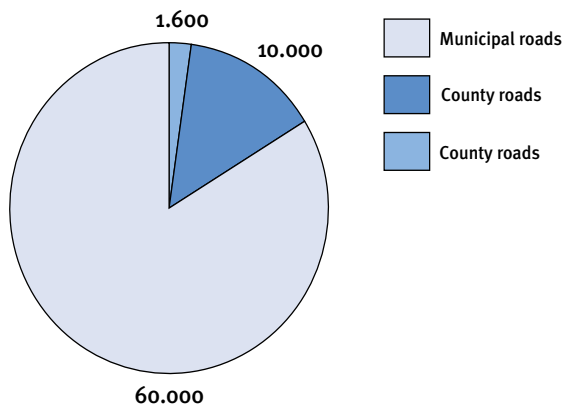
Number of deaths on Danish roads in 1998, by road category



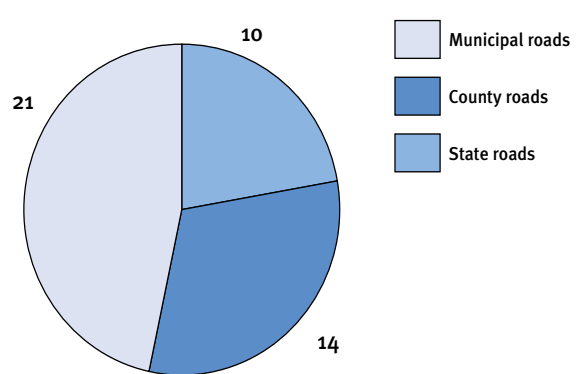
Number of serious injuries on Danish roads in 1998, by road category



Road km, by road category



Road use in billion vehicle-km, by road category



Source: The Danish Road Directorate

Figure 9: Deaths, injuries, road use, and road length

Local road safety committees

Other significant activities in counties and local authorities include the implementation of information and campaign efforts where local knowledge and a particularly local flavour to all campaign activities are often just the things that give a campaign impact. In order to coordinate the many local road safety efforts, the Road Safety Commission recommends setting up more local road safety committees.

Potential participants in local road safety committees

- The local police
- Public engineering/technical departments
- Preventive committees
- Road safety teachers
- Boards of governors at daycare institutions/schools
- Interested and active local politicians
- Significant local organisations

- Local branches of traffic organisations
- Residents' organisations
- Representatives for local driving instructors
- Representatives for local transport service providers

Figure 11. Potential participants in road safety committees

State activities to promote road safety must be intensified

Traditionally, Danish state authorities have played an important part in road safety efforts, and have performed a wide range of tasks. The state authorities are in charge of legislation and regulation on roads, vehicle design and equipment, traffic regulations, the contents and form of driving instruction, police checks of traffic, and a major part of the research and development which takes place within transport/road use.

One important task is to ensure that the efforts made by the many different organisations operating within road safety are coordinated. Such coordination is carried out by



institutions such as the Road Safety Commission, which offer opportunities for mutual exchanges between the many different stakeholders and players within road safety. A major task in the years to come will be to transform the national vision for road safety, 'Every accident is one too many', into concrete results.

The need for coordination of these tasks is also evident when large scale, nationwide information campaigns are to be combined with intensified police checks. Central government will continue to play a major part within this context.

Other major tasks for the Danish state authorities in the years to come will be increased efforts to counteract speeding. These include the introduction of automated speed checks as a nationwide initiative if the current pilot projects prove successful.

The Road Safety and Transport Agency carries out a series of the central government tasks concerning legislation and development within issues such as driving licences, driving instruction, heavy vehicles, etc. This makes the Road Safety and Transport Agency an important state player as regards training and supplementary training of private as well as professional motorists. Moreover, the Road Safety and Transport Agency has overall responsibility for preparing

regulations on vehicle design and equipment, as well as for ensuring that these regulations are complied with.

As a result of the Road Agreement, a large part of the Danish state road network was transferred to the counties and local authorities on 1 January 1998. This means that today, the Danish state is in charge of 2 per cent of the total road network. Motorways account for most of this percentage, and also account for approximately 25 per cent of all Danish traffic. The Road Agreement means that the Danish Road Directorate is responsible for ensuring that the most recent advances and discoveries within road safety are put into active use on Danish state roads. The Danish Road Directorate is also responsible for offering advice and inspiration to municipal and county road agencies on all road safety issues.

Similarly, the state authorities are responsible for increasing research and development within road safety. This is necessary to ensure continual development and communication of our knowledge on how to improve road safety effectively.

Finally, state authorities take part in many different international cooperative forums offering opportunities for exchanging experience, inspiration, and perhaps even joint efforts. The Road Safety Commission recommends that we



should make better use of the excellent international material available to improve road safety during the period to come.

Vehicle design and safety equipment

Electronic communication systems continue to gain new ground in traffic everywhere, and when used correctly, such technology can be used to render traffic safer, more efficient, and more environmentally friendly.

In many cases, however, such technical solutions can also pose problems to road safety by distracting drivers from what is really important - the traffic itself.

These are some examples of appropriate telematics solutions:

- Technical solutions to increase seatbelt use - e.g. warning lights which flash if seatbelts are not worn, or automatic seatbelts
- Electronic information on or adjustment of vehicle speeds depending on road type
- Electronic collision detectors which register distances to cars in front and adjust speeds accordingly

- Electronic breathalyser testing which activates a car immobiliser if the driver has had too much to drink
- Sleepiness detectors to ensure that drivers do not fall asleep while driving
- Crash¹ recorders which store data on the circumstances of any road accidents
- Electronic route guidance systems providing information on the best routes as well as on any traffic jams or accidents ahead
- Finally, road pricing might have an effect on the development and distribution of road traffic to promote greater safety

Today, specific types of passenger cars must comply with certain protection/safety requirements in the event of head-on or side-on collisions, and these requirements will extend to all new passenger cars from 2003. These requirements provide passengers in such cars with a high degree of safety in all accidents involving similar cars, whereas they are insufficient against lorries, etc. Similarly, these safety requirements are of no help any to 'soft' road users.

¹ The "black box" in aircraft.



Studies on road compatibility² have been carried out for years now, and possible solutions have been demonstrated. Examples of these solutions include an energy-absorbing front bumper on lorries, which make it possible for passengers in passenger cars to survive a frontal collision with such lorries at 60 km/hr. Car designs which entail fewer injuries to 'soft' road users in the event of an accident have also been demonstrated.

It seems highly likely that new electronic technologies and opportunities will present new challenges and possibilities within road safety.

² I.e. adaptation to other road users



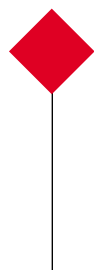
The Road Safety Commission considers that international trials and experience should be carefully monitored, and that development and demonstration projects on telematics should be carried out in Denmark in order to test the advantages and disadvantages involved, including the issue of which solutions have the greatest effect on road safety.

Denmark should work within all relevant fora to have research results on traffic compatibility transformed into actual requirements on vehicle design and equipment.

The police

The police have - and should continue to have - an important role in Danish road safety efforts; especially as regards compliance with regulations and effective, systematic, nationwide control measures. By combining campaigns with target specific police checks and sufficient equipment in all police districts, it is possible to create media attention and focus on special problems on Danish roads, such as speeding or drink-driving. Such media attention can help change road user behaviour.

The police carry out important work in connection with road safety instruction at schools. The police take part in the training of new school patrol members and keep an eye on general school patrol performance.



The police should continue to assist in the registration of road accidents. As all police districts now report accidents through the POL-SAS system, it would be desirable for such reports to be more informative in order to make accident statistics even more detailed and useful for state and local authorities.

Health services

The Danish health service should be far more involved in accident prevention in future. The health service can inform the public of the risks involved in various types of accident, and collect and communicate information on trends regarding the scope of various accident types.

In addition to this, quality assurance measures should be carried out for health service registration of accidents. The objective must be to be able to incorporate police and health service records of various accidents.



Consequently, emphasis should be placed on collecting specific experience regarding the coordination of data on deaths and injured in road accidents from hospital and police records.

Finally, the Road Safety Commission calls for the allocation of resources for nationwide trial projects on systematic collection and communication of data from Danish hospitals in connection with accident prevention.

Follow-up on specific targets

The Road Safety Commission will carefully monitor accident trends during the target period; especially within the four focus areas - speeding, drink-driving, junctions, and cyclists - and for high-risk road users.

The Commission will also closely observe trends regarding the allocation and use of state, county, and municipal

funds for road safety purposes and assess whether sufficient resources are allocated to reach the objectives.

In order to ensure a total follow-up on the new targets and objectives for road safety, the Road Safety Commission will set up a working group which will be responsible for observing that the initiatives proposed are in fact implemented, and that knowledge and experience is collected and disseminated to further these objectives.

Every four years, beginning from the spring of 2005, the Road Safety Commission will prepare a comprehensive, nationwide survey to identify the current status of the initiatives proposed at both national and local levels. This status survey will also involve the Road Safety Commission pointing out where extra or revised effort is required, where new initiatives are necessary, and where assessment of completed activities is called for.

Finally, the Road Safety Commission will take initiative to carry out an evaluation in 2001 of all Danish road safety efforts made during the period 1998 - 2000.



The four focus areas

In the Strategy Plan 1995 - 2000, the Road Safety Commission recommended a prioritisation of road safety efforts for four types of accident:

- Accidents involving speeding
- Accidents involving drink-driving
- Accidents involving cyclists
- Accidents involving road junctions

The basis for these recommendations is that 85 per cent of all accidents have speeding, alcohol, cyclists, or road junctions as a significant accident factor. There is still great potential for combating road accidents within these four focus areas with familiar methods and tools. For example, current technology offers good opportunities for intensifying speed checks on Danish roads.

The Road Safety Commission proposes that all road safety efforts should be concentrated on these four focus areas during the first four years after 2000. The four focus areas are crucial tools in our efforts to realise the vision 'Every accident is one too many'.

The four focus areas within local authorities

The four focus areas: speeding, alcohol, cyclists, and road junctions, are becoming firmly anchored in Danish municipal road safety efforts:

- Two-thirds of all local authorities have implemented measures directed against speeding.
- Half of all local authorities have implemented measures directed against accidents at road-junctions.
- Half of all local authorities have implemented measures directed against cycling accidents.
- One-third of all local authorities have implemented measures directed against drink-driving.

Source: The Danish Road Directorate's study of local authority road safety efforts.

Speeding

In contrast to the other focus areas, we do not have a clear image of how many people are killed or maimed on Danish roads due to speeding. It is, however, estimated that speed is a factor in between 25 and 50 per cent of all road accidents involving personal injury.

The correlation between speeding and accidents has been well documented; higher speeds equal higher risks of accident and worse consequences of such accidents. For example, an Australian study shows that the risk of becoming involved in an accident doubles for every 5 km/hr in excess of a 60 km/hr speed limit. At 70 km/hr, the risk is four times greater, and at 75 km/hr, the risk is eight times greater.

In Denmark, this correlation was illustrated by the introduction of general speed limits in 1974. These new speed limits effected a drop in average speeds which reduced the number of deaths in road accidents by 25 per cent in just one year - despite virtually unchanged road use statistics.



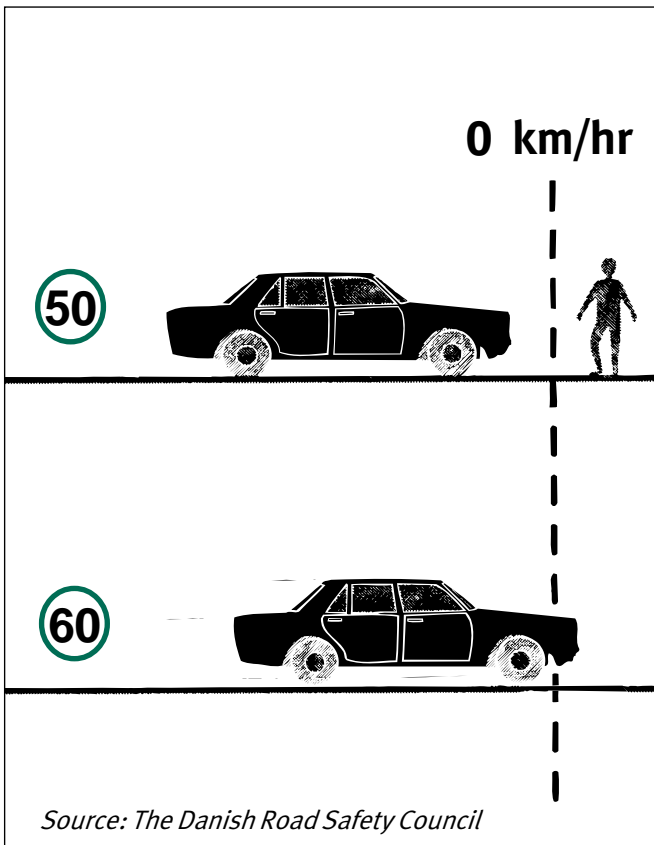


Figure 12. Small difference - great effect: In a situation where a driver driving at 50 km/hr just manages to stop the car for a child crossing the road, a driver driving at 60 km/hr would hit the child at a speed of 44 km/hr.

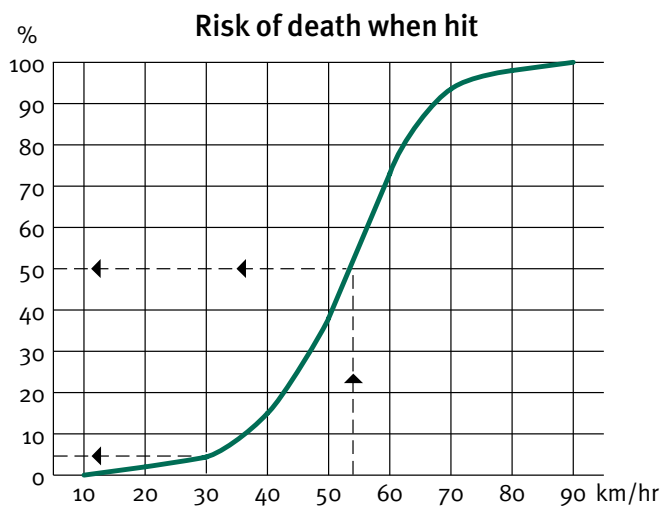


Figure 13. Pedestrian risk of death when hit by a car: A pedestrian has a risk of being killed of less than 5 per cent if hit by a car driving at 30 km/hr or less. The risk of being killed increases rapidly at greater speeds. At slightly more than 50 km/hr, the chance of survival is 50 per cent.

One of the greatest potentials for improving road safety lies in reducing speeds. The Road Safety Research Council has calculated that if average actual speeds matched legal speed limits, the result would be 100 fewer deaths and 1,500 fewer injuries.

The Danish Road Directorate regularly carries out surveys of average speeds on Danish main roads. These surveys show that we still face problems regarding compliance with the speed limits - both on motorways, main roads, and urban roads.

In the period to come, it is vital to create general public appreciation and support for the need to reduce speeds on Danish main roads, country roads, and urban roads. Of course, such appreciation and support must also bring about concrete action, so that even more road users observe the speed limits in future.

It is particularly important to have drivers of heavy vehicles observe all speed limits. Indeed, heavy vehicles are involved in 25 per cent of all fatal road accidents. This does not necessarily mean that the drivers of heavy vehicles are responsible for such accidents; but it does clearly indicate that road accidents involving heavy vehicles are almost always serious. A reduction in speeds would reduce the risk of accidents while also limiting their consequences.

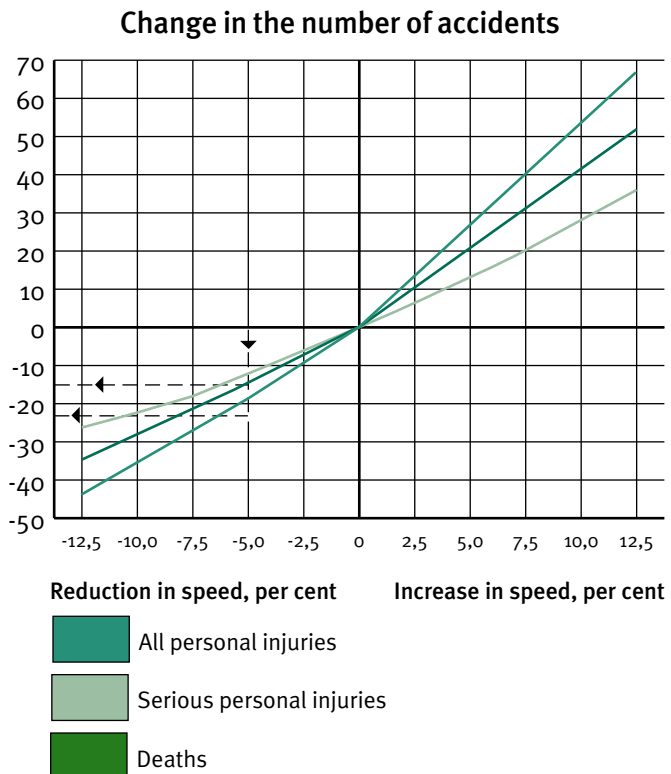
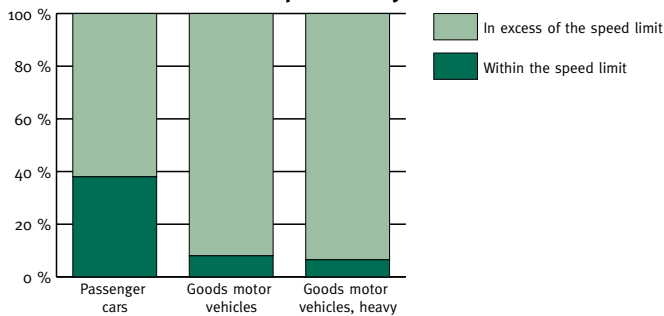


Figure 14. Correlation between speeds and accidents: The number of serious personal injuries drops by approximately 15 per cent if the average speed on a given road drops by 5 per cent, e.g. from 50 km/hr to 47.5 km/hr. The corresponding drop in the number of deaths will be more than 20 per cent.

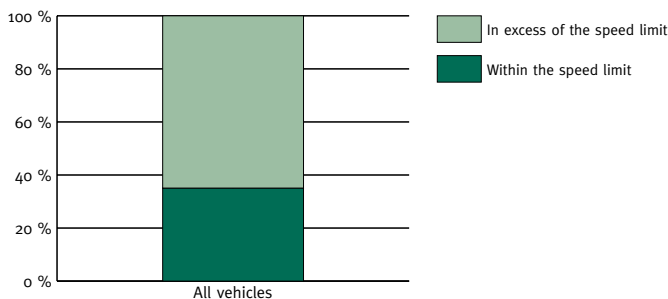
Motorways in the countryside



Expressways



Urban roads 50 km/hr

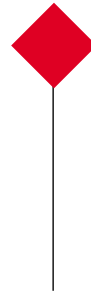


Source: The Danish Road Directorate

Figure 15: Speed studies on various road types

A wide range of methods and tools must be used to reduce speeds, including police checks, redesign of road layouts, and information/campaign activities. The objective is to make those drivers who still think that speed limits are discretionary change their behaviour and take their foot off the accelerator.

Of course, information and knowledge are important tools, but all our experience tells us that information cannot stand alone. Good results have been achieved by combining campaigns with intensified and highly visible police checks. Local approaches to speed campaigns have also proven effective.



Consequently, the Road Safety Commission proposes that the current collaboration between local road safety committees and the Danish Road Safety Council on a five-year campaign strategy for initiatives regarding speeding should be carefully observed. Such a long-term campaign strategy should be expanded in more detail in the target period to come.

Urban speeding

The risk of accidents in urban areas is three times greater than the corresponding risk on main roads and primary roads outside cities. More than 80 per cent of all accidents involving 'soft' road users happen in cities. This means that there is great potential for reducing the number of accidents involving 'soft' road users by addressing speed levels in urban areas.

A study made by the Danish Road Safety Council shows that only one in three of all road users observe the speed limits in urban areas. In the same study, one in four of all road users state that driving 60 km/hr rather than 50 km/hr has no impact on road safety.

This was one of the reasons behind the implementation of the trial project on automated speed checks in 1999. The objective is to reduce speeds in urban areas, thus hopefully achieving a positive impact on accident statistics.

Speeding on primary roads

Most accidents happen in urban areas, but the greatest number of serious accidents happen on roads in the countryside. In 1998, 499 people were killed on Danish roads. Of these, 359 were killed outside of urban areas, mainly on normal primary roads with a speed limit of 80 km/hr. Consequently, there is reason to address speed and accident trends on countryside primary roads. Emphasis should be placed on the following areas and efforts:

- Accidents with oncoming traffic
- Road marking at dangerous curves
- Local reduction of speed limits in curves and junctions
- Nationwide information on the necessity of observing speed limits on primary roads.

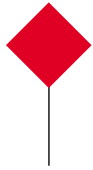
The physical and legislative measures to reduce the number of accidents on primary roads are to be followed up by target specific information and campaigns to create acceptance of - and if possible support for - the legal speed limits.

Local speed plans

A local speed plan for road safety presupposes a systematic survey and assessment of all roads within a given municipality in terms of their function and layout. For example, it should be determined whether the various

roads and streets should be classified as traffic roads, local roads, residential streets, industrial roads, ring roads, or school roads. When all municipal roads and streets have been systematically surveyed in terms of usage and layout, subsequent assessments of what the speed limit on each individual road should be will be carried out. For example, on many local roads and school roads it would be expedient to set the speed limit at 40 or 30 km/hr.

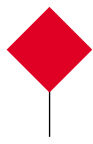
A local speed plan will normally also include a catalogue of the means and methods to be used to achieve the desired speed reduction, as well as an overview of the tools to be used on specific roads in order to achieve such reductions.



The Road Safety Commission recommends that all local authorities and counties prepare a local speed plan as a central feature of the local road safety action plans.

Speed differentiation

Generally speaking, vehicles should not exceed 50 km/hr in urban areas. Road areas which are shared by drivers, pedestrians, and cyclists should, as a basic rule, have speed limits of 30 - 40 km/hr. This will typically be roads with no separate cycling path or pavement, or roads with many 'soft' (high-risk) road users, e.g. residential streets, near schools, institutions, etc.



The Road Safety Commission holds the view that speed differentiation should be used to a far greater extent in urban areas in future.

Speed restrictions

A variety of measures and initiatives can be used to reduce speeds in urban areas. It is important to ensure proper interplay between the various elements, which may include speed bumps, road islands, bottlenecks, rumble strips, city gates, raised strips, and roundabouts.

Speed bumps are the most effective of these measures. At the same time, bumps are relatively cheap when compared with larger restructuring measures.

If speed bumps are not constructed correctly, they can pose a working environment problem for bus drivers, lorry drivers, and other professionals who travel extensively on Danish roads every day. This means that it is important to establish all bumps in accordance with the circular on construction of speed restricting bumps issued by the Danish Ministry of Transport.

Roundabouts are also effective when it comes to reducing speeds. The Danish Road Directorate estimates that roundabouts can reduce speeds to approximately 30 km/hr immediately before, in, and immediately after the roundabout. This effect subsides gradually at a distance between 100 and 250 m from the roundabout, but

roundabouts can be combined with other speed-restricting devices. However, roundabouts are often considered less safe by cyclists. As a result, special attention should be paid to cyclists' needs when designing roundabouts.

Urban thoroughfares

Urban thoroughfares are traffic roads that intersect small urban communities. Such roads often feature a complex interplay with an accumulation of road accidents through the town, resulting in growing insecurity for 'soft' road users and pedestrians wishing to cross the thoroughfare. Such cases often occasion environmentally prioritised projects where average speeds are reduced through redesigning the road layout while also taking into account the residents' wishes regarding the new road layout.

Alcohol

Alcohol continues to be involved in almost one in four fatal road accidents in Denmark.

The efforts directed at drunken drivers so far have consisted of information and campaign activities combined with target specific police checks. These efforts have proven effective.

Such activities must continue if we wish to see a continuous reduction in the number of alcohol-related road accidents.



We know that drink-driving is a particularly big issue among young people in general - particularly at the weekend - and among men between the ages of 30 and 50. As a result, the Road Safety Commission proposes the preparation of special, target specific campaigns directed against these two groups. The so-called 'Say No' campaigns against drink-driving have been very successful, for example the 'Guardian Angel Campaign', which has run for several years in the county of Northern Jutland. The Road Safety Commission points to the opportunities for more widespread use of similar campaigns throughout Denmark.

The Road Safety Commission also proposes to intensify police measures directed against drivers who are under the influence of alcohol. There is a special need for carrying out such measures during the summer, when the greatest number of drink-driving accidents occur.

The Road Safety Commission recommends special initiatives directed against drivers who have had their driving licence suspended due to drink-driving Danish legislation now stipulates compulsory

training on the correlation between alcohol and driving for such drivers. Such training should be studied in order to collect information and improve this effort on a regular basis. In addition to this, the number of drunken drivers receiving treatment for alcohol abuse should be increased during the target period.

Finally, the Road Safety Commission considers that there is a need for special measures directed against drivers who are repeatedly apprehended for drink-driving. For example, it should be possible to carry out trial projects with car immobilisers which are only deactivated by successful breathalyser testing as part of the treatment of drunken drivers with multiple convictions.

Bicycles

Every year, approximately 60 cyclists are killed and almost 2,000 cyclists are injured on Danish roads. In addition to this, even more bicycle accidents happen every year without ever being registered by the police and in the statistics.

The number of accidents involving bicycles dropped during 1998. It is likely that this was partly due to the general drop in bicycle usage. We have yet to see whether the introduction of new regulations on bicycle equipment - including reflector tabs on the sides - have any effect on cycling accident statistics.

However, cyclists remain a high-risk group, especially when the number of accidents involving cyclists is calculated per kilometre travelled.

Serious bicycle accidents usually involve cars as the other party. The seriousness of the injuries sustained by cyclists is very much dependent on the speed of the car involved. If we wish to take effective steps to improve road safety for cyclists, a reduction in car speeds, particularly in urban areas, is crucial.

The Road Safety Commission wishes to promote safe cycling and calls for intensified efforts in the years to come to reduce the number of accidents involving cyclists. Such efforts include physical measures as well as information and campaign activities with special focus on cyclist safety. The information efforts on cyclist safety must have particularly close links to training/instruction of children and young people.

Cycling must be made safe and attractive. Several towns and cities have already proven that concerted, target specific measures directed against cycling accidents can provide results. For many years, Odense Local Authority has taken the lead when it comes to creating safe road conditions for cyclists in the city. Indeed, this is why

Odense has been awarded the title of 'National Cycling City'. The idea now is to create a full-scale laboratory to collect experience on how to create a city where cycling has priority. The trial project 'Odense as National Cycling City' will run until 2004.



The Road Safety Commission proposes that the experience and knowledge gathered from the bicycle projects in Odense Local Authority and elsewhere should be communicated and used nationwide. The larger towns and cities offer special opportunities for promoting bicycle traffic.

Studies carried out by the Danish Road Directorate show that an increase in bicycle traffic on a given route does not increase the total number of personal injuries in traffic. Quite the opposite: more bicycle traffic on a given road reduces the risk for individual cyclists.

A number of measures have proven to have an effect on cyclist safety. Some of these measures are listed under the headings 'speeding' and 'road junctions', so only those initiatives specifically aimed at cyclists are listed below.

Traffic segregation

Cyclists, pedestrians, and cars can be separated. In urban areas this can be done by dividing all traffic into zones, so that car traffic is restricted to a few traffic roads. In the countryside it can be done by establishing cycling paths between towns.

Establishing cycling-path networks

Even short stretches of a long, mainly safe bicycle route can result in the bicycle being discarded as a means of transportation if these stretches are seen as dangerous or cumbersome to cyclists. As a result, it is important that Danish local authorities and counties establish interconnected cycle networks. These networks can consist of cycling paths and roads with sufficiently modest car speeds which make it safe to ride a bicycle on the entire journey.

Redesigning road junctions to take cyclists' safety into account

Road engineering is required to improve cyclists' safety at road junctions. For example, this may be done by establishing recessed stop lines for cars, so that cyclists have a small head start at the green light and the drivers become aware of the cyclists.

Cycling-path maintenance

Many solo accidents among cyclists occur due to potholes, uneven edges, sharp turns, or unpredictable protrusions. Maintenance must be accorded high priority on places with heavy bicycle traffic.

New vehicle requirements

Efforts are being carried out at European level to prepare vehicle requirements which stipulate that the front end of cars must be designed to cause fewer injuries to 'soft' road users in the event of an accident.

Cycling helmets and other safety equipment

Cycling helmets have a documented effect on the number of head injuries sustained on Danish roads. Even so, the vast majority of Danish adults - and far too many children - continue to cycle without wearing a cycling helmet. Cyclists can also improve their own safety by using bicycle lights, keeping their bicycles in good repair, and by using the required reflector tabs.

In addition to this, cyclists can improve road safety for themselves by observing all traffic regulations, including the duty to give way to approaching traffic. Cyclists should also reduce their speed at road junctions and be more careful in situations where there may be a danger that other road users are not aware of their duty to give way or cannot see the cyclists.



The Road Safety Commission calls for the implementation of several recurring nationwide campaigns in the period to come - for example as a collaboration between the Danish Road Safety Council and the health services. These campaigns should be aimed at persuading more adults to use their heads and wear cycling helmets, and should also aim to make children wear helmets and continue to do so as they grow up.

The Road Safety Commission recommends the introduction of a minimum standard for bicycle lights. The Commission also recommends that a study be carried out to determine whether a general requirement for fixed bicycle lights on all bicycles could help improve road safety for cyclists.

The Road Safety Commission recommends that all local authorities and counties incorporate cyclist safety in local road safety plans and all other local planning in order to ensure continued reductions in the number of deaths and injuries among cyclists.

The Road Safety Commission considers that it is necessary to intensify the present research activities on cycling issues in order to improve our chances of identifying effective measures to reduce the number of cyclists involved in road accidents.



Road junctions

Almost half of all road accidents happen at junctions, and almost 200 people are killed and approximately 4,800 injured in road-junction accidents every year. The two typical accident factors are failure to observe the duty to give way to oncoming traffic and speeding.



Great benefits in terms of road safety can be achieved by aiming efforts at improving traffic conditions at junctions. The Road Safety Commission recommends that individual road junctions in Danish counties/municipalities be surveyed in order to determine the most serious safety issues at each junction, and to identify the measures to best solve these problems.

The Road Safety Commission wishes to indicate the need for more effective efforts directed against drivers who jump red lights at road junctions. The Danish Road Directorate estimates that drivers jumping red lights account for 20 deaths and 500 injuries every year. Consequently, the results of the trial project implemented in 2000 on automated checks of red light

observation and speeding should, if successful, be followed up and disseminated throughout all of Denmark.

Roundabouts

Roundabouts are effective in reducing speed and also have fewer conflict points than traditional T-junctions and crossroads. Roundabouts are particularly effective on primary roads. Here, roundabouts can reduce the number of injuries to just ten per cent of previous levels. In urban areas, the number of people injured is reduced to 33 per cent of previous levels. This effect is, however, more pronounced for drivers, whereas the number of bicycle accidents remains unchanged. The trend is, however, for such accidents to be less serious for the cyclists hit than would otherwise be the case.

Speed reductions at junctions

Studies show that the number of accidents at road junctions on primary roads with an 80 km/hr speed limit drops if the average speed through junctions is reduced to 60 or 70 km/hr. The Road Safety Commission calls for greater use of this initiative.

Stop signs

Stop signs at road junctions without any traffic lights are a very cheap and effective measure - one which many local authorities do not yet use, according to the Danish Road Directorate study of municipal road safety efforts. Thus, there is relatively great potential for reducing the number of accidents by means of this simple measure. However, the effect of stop signs is greater if they are not placed at all road junctions; they should be placed specifically at those junctions where many accidents happen. If stop signs were to be used on a massive scale, the actual effect might prove limited, as experience shows that road users lose respect for the signs when used too frequently.

Better traffic lights

A number of measures directed at traffic lights can help improve road safety. These measures include longer pauses, more visible lights, road islands for pedestrians, traffic channelling, traffic control, etc.

Measures against accident black spots

Identification of black spots and subsequent improvements to road safety at junctions is a tried and tested way of combating road accidents.

All road authorities are called upon to use the annual reports from the police to pinpoint the location of all accidents in order to systematically identify black spots - i.e. places where road accidents occur too frequently in view of the amount of traffic and road type.

Familiar, yet effective solutions

The total list of proposed initiatives includes a number of suggested solutions which do not fall directly under the headings of the four focus areas, i.e. accidents due to speeding, drink-driving, accidents involving cyclists, and accidents at road junctions. Some of these proposals are of a technical nature, such as:

- Better or modernised road lighting
- Measures to improve safety in curves
- Measures addressing the so-called 'grey areas', i.e. stretches of roads with particularly high accident rates
- Use of new and safer intersections on roads in the countryside.

During the twelve years to come, it will be necessary to devote more attention and resources to such technical measures. Consequently, costs as well as safety impacts of these measures have been included in calculations.



New knowledge, research, and development

One objective of the Road Safety Commission is to increase and intensify research efforts during the target period. In particular, the Road Safety Commission wishes to point to three areas where more knowledge is needed:

1. Causes of accidents and risk perception; road user behaviour and the effect of measures.
2. Models to carry out total analyses of the correlation between road safety and the environment, urban development, public health, and other themes where interplay is significant.
3. Development of tools for prioritisation and evaluation. Such tools are to be used to identify the most effective measures, to evaluate accident statistic trends on a regular basis, and to evaluate measures and initiatives implemented.

More research is required within the following areas:

IT solutions

We can expect rapid developments within car equipment for navigation, warning systems, and general information systems. It is important to examine the road safety aspects of such equipment, as some of it may distract drivers' attention from the actual traffic around them.

Cyclist safety

There is still a need for more detailed analyses of accidents involving cyclists, as well as for practical trial projects on new road-engineering solutions for cyclists. These initiatives must be supplemented by studies of behaviour and risk perception and of the impact of new transport habits in society, especially pertaining to children and young people.

Impact of changes in road user behaviour

More attention should be focused on the interplay between transport system design, legislation, training/education, sanctions and risk of detection, and information/campaign activities.

Road users under the influence of drugs

We still lack sufficient knowledge on the extent to which Danish road users drive while under the influence of drugs (narcotics or pharmaceutical products which may cause hazardous behaviour in drivers). Similarly, our knowledge on the extent of accidents involving drugs of any kind is also very limited. Finally, we lack knowledge on the extent to which various degrees of influence or withdrawal symptoms affect driving skills and reaction times.

Evaluation of campaign impacts

We need more systematic reviews of campaign methods and tools as well as of the impact of campaigns completed, both in the short and long terms. Moreover, trial projects should be implemented to try out more extensive and target specific use of electronic media (including television and the Internet) to communicate messages with an especial focus on road user behaviour.

Elderly road users and future traffic

Elderly people in the transport systems of the future will constitute an important focus area with many sub-elements. The percentage of elderly people among the Danish population will increase, as will the proportion of transport activity accounted for by elderly people. What consequences will these changes in the population profile have for road safety, and how can we do more to prevent road accidents involving elderly people? We also lack knowledge of elderly peoples' perception of risk in traffic.

Road users and risky behaviour

The correlation between road users who are involved in road accidents and previous traffic offences should be examined during the target period.

Accidents with oncoming traffic on primary roads

The Road Safety Commission will propose large-scale trial projects involving new speed limits, restricted overtaking, new road design, new signposting, etc.; particularly on older primary roads.

Clear lines of view at road junctions

There is a need for elucidating the significance of clear lines of view at road junctions for road user behaviour and road safety.

Speed as an accident factor

Speed is very important to road safety - both as regards the number of accidents and the consequences of such accidents.

However, our knowledge of speed factors and new ways of controlling speeds is insufficient. Consequently, these areas should be included in research efforts within road safety.

Risk assessment

More precise models based on more detailed data must be developed to elucidate the risk involved in the use of various means of transport; including the risk involved in travel using several different means of transport.

Passive safety

It is highly likely that new equipment to improve the passive safety of drivers and car passengers will continue to arrive in the marketplace. There will be a need for studies of the effect of such equipment and devices; both for road users inside and outside of the vehicle in question.

Residents' involvement

Local road safety projects with an emphasis on direct resident involvement should be implemented.

Road safety indicators

As a supplement to road-accident registration and transport-habit surveys, the Danish road safety effort needs more systematic collection and registration of a number of indicators for the state of road safety in Denmark. Initiatives in this respect could include a nationwide speed index and surveys on the use of safety equipment such as cycling helmets and seatbelts. Such a set of indicators could act as an assessment of general trends while also providing knowledge on possible causes of accident trends.

International research

Steps should be taken to ensure a high degree of Danish participation in international research projects, partly to obtain new perspectives within our road safety research, but also in order to benefit from foreign results whenever such results promise to have a positive impact in Denmark.

It should also be considered whether it would be expedient to carry out comparative studies of road safety efforts in various countries in terms of methods, means, and success rates.

Accident Investigation Board for road accidents

More detailed and systematic knowledge on the causes and circumstances of various types of road accidents can provide a good basis for target specific, preventive measures to reduce the number of accidents on Danish roads.

An Accident Investigation Board for road accidents is to be established on the basis of the experience gathered from the Danish Road Safety Council's Analysis Group for Road Accidents; a group which carries out in-depth analysis of selected accident types.

This Accident Investigation Board is to carry out cross-sectional in-depth analyses of selected accident situations and themes in order to improve our knowledge on the causes and circumstances of special types of road accident. These efforts must be used to advance specific proposals on how to avoid similar accidents in future. The areas studied will include road design, traffic flow, campaigns, vehicle design, and possibly legislative amendments.

The main objective of the Accident Investigation Board will be to collect knowledge to be used for the prevention of road accidents. The Accident Investigation Board will be working independently from the police and motor vehicle inspectors as regards their work to determine the question of guilt in connection with individual accidents.

The Accident Investigation Board should be interdisciplinary in terms of its composition and should include motor vehicle inspectors, traffic psychologists, road engineers, police officers, and medical personnel.

The Accident Investigation Board will only be able to address a few of the accidents on Danish roads. It will be able to address selected road accidents that represent areas where we need to improve our knowledge.



The Road Safety Commission recommends the establishment of an Accident Investigation Board for road accidents as soon as possible, and the Road Safety Commission will monitor the work of such a Board on a regular basis. The exact composition of an Accident Investigation Board for road accidents and its work should be determined on the basis of input from the relevant organisations.

If the work of such an Accident Investigation Board yields marked results, the Road Safety Commission wishes to see increased efforts within this area.

Current Status

This appendix includes an overview of the current status of road safety efforts in Denmark. These conclusions are based on the 1996 Road Safety Commission Status Report for the Road safety Action Plan.

The Road safety Action Plan has had a positive impact on road safety efforts at all levels. On the basis of the recommendations of the Plan, a series of legislative measures have been adopted, and collaboration between the many players within road safety has been intensified.

Statistics from Statistics Denmark for 1998 show that the number of deaths in road accidents was 499. The objectives set by the Road Safety Commission have been within reach as far as the number of deaths is concerned. This also applies to the number of serious injuries, whereas the number of minor injuries only fell by 10 per cent throughout the entire period.

In 1999, the number of deaths in road accidents has so far been calculated at 500. Of course, this figure may simply reflect a statistical fluctuation, but when we consider the preconditions of the calculations in the Government's action plan, we can identify two possible factors which may help to explain why the Road Safety Commission's objectives seem to be growing more distant again:

- The growth in traffic has been twice as great as the 1.8 per cent per year outlined in the forecasts. As a rule of thumb, it can be estimated that a growth in traffic of one per cent entails a growth in the number of accidents of 0.5 to 0.7 per cent.
- Speeds have not fallen as outlined in the assumptions. The Government's action plan expected the trial project on automated speed checks to be successfully completed in 1998. Thus, automated speed checks should have been introduced all over Denmark before the end of 1999.

In summary, the annual number of deaths and injuries on Danish roads has fallen since the Road Safety Commission's action plan was implemented, even if the actual drop does not quite match the targets originally set by the Road Safety Commission.

Local road safety efforts in particular have increased during the second half of the action plan period and must be considered an important basis for future efforts.

The vast majority of the 16 legislative 'S proposals' advanced in the 1988 action plan have been implemented under the auspices of the Road Safety and Transport

Agency. The amendments made include requirements for extra side-view mirrors on lorries, more stringent requirements on other lorry features and equipment, and a requirement stipulating that all drivers must switch on their headlights during daylight hours.

Moreover, all drivers and car passengers (back seat as well as front seat) must now wear seatbelts.

The technical aspects on the action plan 'motorcycle package' have been implemented. This also applies to the scheme for supplementary road instruction for 15-19 year olds.

The campaigns completed have included activities aimed at drink-driving, young drivers, motorcyclists, and greater use of cycling helmets. Treatment schemes for road users with convictions for drink-driving have also been introduced, as have additional requirements in connection with the acquisition of driving licences for lorries and buses.

At the end of the action plan period, the legal limit for the alcohol/blood ratio in connection with driving was reduced from 0.8 to 0.5 g/100 ml, and the sanctions for speeding offences were tightened so that driving licences are suspended (with suspended execution) at speeds exceeding the legal speed limit by 70 per cent (40 per cent for lorries and passenger cars with trailers).

The 16 'L proposals' of the plan were assumed to have been implemented by the three road authorities - the state, counties, and local authorities. We can now conclude that these initiatives have only been partly implemented. One initiative, differentiated speeds in urban areas, has only been implemented on a trial basis by a few local authorities.

A 1997 survey from the Danish Road Directorate shows that Danish local authorities spend more than DKK 400 million per year on improving safety on their roads. This study shows that more than half of all Danish local authorities now have - or are in the process of preparing - an action plan for their road safety efforts. Most local authorities have prepared their plan with support from the Road Traffic Pool under the Danish Ministry of Transport.

The local authorities in the county of Northern Jutland were among the first to prepare road safety action plans, and it appears from this area that local authorities with road safety plans increase the funding allocated to prevention of road accidents.

Implemented initiatives

Accidents involving alcohol

A number of initiatives have been implemented with a view to reducing the frequency of drink-driving. These initiatives include local and national information activities, target specific police efforts during the summer, and treatment for drivers with convictions for drink-driving.

Legislation

A number of new Acts and regulations have been adopted and implemented as follow-up to the recommendations made by the Road Safety Commission in the 1988 Action Plan. The changes made within vehicle design include a reduction in taxes on airbags, extra side-view mirrors on lorries, compulsory ABS brakes, and side screens on lorries.

Initiatives to change road behaviour include the compulsory use of headlights during the day, compulsory seatbelt usage for all car passengers, and stricter regulations on the use of safety equipment for children under the age of three.

Interest in local road safety efforts

Local interest in road safety has proven considerable, especially during the latter half of the previous target period. More resources have been spent on local safety information activities than projected in the action plan. It is now recognised that local road safety work must spread like ripples on water to form the basis for even more results.

Road safety plans

The 1988 action plan recommended the use of local-authority plans as an active tool in road safety efforts. The Commission pointed out that local-authority planning should balance the various, more or less mutually exclusive, issues.

Resident involvement in local road safety work

Three out of four of all Danish local authorities often involve their residents in road safety efforts, just as 70 per cent of all local authorities accord great significance to cooperation with residents. Residents' desires constitute one of the four crucial factors listed when local authorities describe the activities to promote road safety. Support from state pools, highly committed local-authority staff, and active politicians are the other three factors. The two factors identified by local authorities as obstacles to local road safety efforts are lack of money and lack of manpower.

Source: The Danish Road Directorate's study of local-authority road safety efforts in Denmark

Accident black spots

Impact surveys of implemented black-spot projects show that the resultant drop in accidents corresponds to the expectations outlined in the action plan.

Action plans

Special action plans, such as action plans for standard four-point road junctions without traffic lights, have provided the expected, very positive and cost-effective results in terms of reducing the number of accidents.

Roundabouts

Roundabouts have proven to be a very safe traffic solution. Reductions in the number of injuries of between 60 and 80 per cent have been measured. The effect is more pronounced for drivers than cyclists. As a result, there is a need for further development of roundabout design to improve cyclist safety and ease of travel.

Other measures to reduce speed

Impact studies of environmentally prioritised thoroughfares on main primary roads have shown greater reductions in the number of accidents than projected in the action plan. Speed bumps are cheap to establish and prevent many accidents.

In April 1999, automated speed checks were intensified on Funen and in Copenhagen.

Results from speed surveys show that average speeds in areas with automated checks have dropped by up to 2.5 km/hr when compared against the speeds without such checks. In addition to this, the percentage of vehicles exceeding speed limits by more than 10 km/hr has been reduced by up to 10 per cent.

These statistics do, however, encompass great differences. The speed limits on individual roads differ, and the greatest effect is seen on roads with a speed limit of 50 km/hr. The automated speed checks have had no discernible effect in Odense, whereas Svendborg saw a drop in average speeds of 2.5 km/hr, with the corresponding figure for the Copenhagen area being approximately 1 km/hr.

In collaboration with the Municipality of Gladsaxe, the Road Traffic Pool funded a project on differentiated speed limits.

In 1996, a zone with a local speed limit of 40 km/hr was established on a trial basis in the neighbourhood known as Mørkhøj. A working group composed of local residents, the police, and HT selected the road junctions and roads to be focused on, and a limited number of speed bumps, etc., were established in those areas. In conjunction with an extensive local campaign, these efforts helped reduce average speeds in the neighbourhood by between 19 and 32 per cent. This positive result, which also led to a positive attitude towards the trial project among the local residents,

has encouraged the local authority to use funding from the Road Traffic Pool to establish another trial zone with a 40 km/hr speed limit in 1998, and in 1999, the local authority will establish similar speed zones in the remaining residential areas.

The Road Traffic Pool

A large number of demonstration projects have been carried out with support from the funds available from the Road Traffic Pool. These projects are necessary when new knowledge, e.g. from research, is to be used as the basis for practical solutions, and they are necessary for us to develop solutions to the traffic issues of the future.

For example, the Road Traffic Pool has granted support for projects to test new initiatives to ensure better conditions for bicycle traffic. A combination of new and familiar tools and methods has been tested. Moreover, support has been granted for a large number of road safety projects.

Initiatives which require intensified efforts

Speed planning

Only at the end of the target period have trial projects on overall speed plans for differentiated speed limits within

local authorities been carried out, and traffic sanitation and conversion of traffic roads to local roads have only been carried out in a few places. Generally speaking, the systematic efforts aimed at speeding in urban areas have not had the impact projected in the action plan.

Road safety for cyclists

Cyclists have experienced a drop in the number of road accidents in recent years, and the percentage of cyclists in accident statistics is also falling. However, cyclists still face high risks per km travelled when compared to drivers, and some of the drop in the number of road accidents can be explained by a general drop in bicycle use.

Efforts directly aimed at cyclists have not had the same scope as efforts directed at motorists. For example, some of the proposals aimed at cyclists have not been sufficiently implemented. This applies to issues such as a reduction in car speeds in urban areas, speed checks, speed reduction, and speed monitoring.



Overview of the 62 proposed initiatives

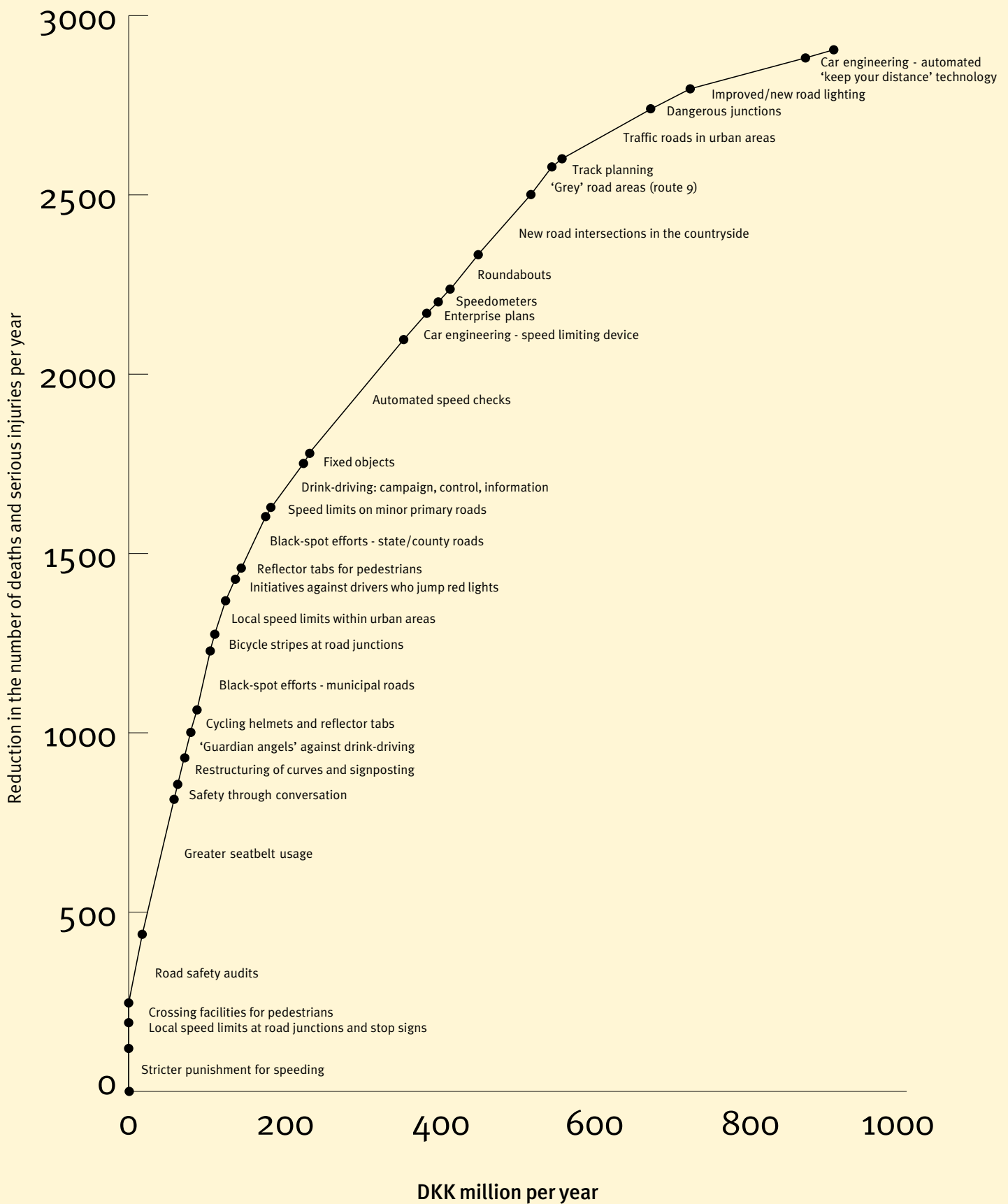
The Road Safety Commission recommends 62 different initiatives to improve road safety during the twelve years to come. Some of the initiatives proposed are general recommendations, e.g. the proposals for improved databases, increased collaboration between various players, and collection of new knowledge. These types of activity are significant for the effectiveness of road safety efforts, but it is not possible to calculate their effect.

Other recommendations are more specific in nature, and the effects and costs associated with such efforts have been calculated. Calculations show that together, these efforts will reduce the number of deaths and serious injuries on Danish roads by at least 40 per cent. All efforts with calculations are listed in [blue](#) in the list below.

1. Electronic media campaigns on speeding, drink-driving, and seatbelts
2. Road user organisation and other organisations must be included in dialogues with individual road users
3. Road safety must be accorded greater emphasis in county/municipal planning
4. Citizens are to be motivated to participate in local road safety efforts
5. Local action plans for road safety within all local authorities
6. Local road safety committees
7. Improvements in the quality of driving instruction, including improved regulations for the training of driving instructors
8. [Nationwide road safety campaigns combined with police checks](#)
9. [Greater fines for driving without wearing a seatbelt](#)
10. [Consider whether the exemptions from seatbelt usage should continue to apply to certain professional groups](#)
11. Surveys of seatbelt wearing
12. Road safety must be included in everyday activities at daycare centres and schools
13. Road safety must be included in the curricula at colleges of education
14. [Efforts to make more parents walk or cycle with their children to their daycare centre or school. This initiative includes efforts to promote use of reflector tabs, etc., on clothing](#)
15. Efforts directed against high-risk driving among young men
16. Information and training on risky driving
17. Consider the introduction of a 'points scheme' for driving licences, particularly aimed at getting young men to drive more safely
18. Prepare the traffic system for far greater numbers of elderly road users
19. [Enterprise plans for road safety](#)
20. Guidelines for enterprises on enterprise plans for road safety
21. [Road safety audits](#)
22. [Safety improvements of roads in the countryside](#)
23. [Better road lighting](#)
24. [Restructuring of 'grey' road areas](#)
25. Draw on good international research results - and consider comparative studies of road safety efforts in various countries

26. Development and demonstration projects on telematics
27. International requirements on vehicle design and equipment as regards telematics and road safety
28. Accident statistics must be more detailed
29. Collect experience on coordination of hospital data and accident records from the police
30. Trial projects on systematic collection and communication of hospital data on road accidents
31. Evaluate Danish road safety efforts from 1988 to 2000
32. Automated speed checking must be introduced all over Denmark if the trial project yields positive results
33. Funding of local road safety efforts via fines from automated speed checks
34. County/municipal speed plans
35. Speed limits on low-standard primary roads
36. Speed differentiation in urban areas
37. Restructuring of urban thoroughfares
38. Dynamic speedometers
39. Intensified police efforts directed against 30 - 50 year old drivers under the influence of alcohol - particularly during the summer half
40. 'Say No' campaigns aimed at young drivers in all counties
41. Special efforts aimed at drivers who are repeatedly apprehended for drink-driving, including trial projects on car immobilisers to be deactivated by successful breathalyser testing
42. Extended supplementary training for drivers whose driving licence is suspended due to drink-driving
43. Efforts directed against drugs in traffic
44. Greater segregation of traffic in urban areas
45. Improved opportunities for crossing roads for pedestrians
46. Interconnected route network for cyclists
47. Restructuring of road junctions
48. Maintenance of cycling paths
49. New requirements for vehicles, including new front-end designs to reduce injuries to 'soft' road users if hit
50. Campaigns for greater cycling-helmet usage
51. Minimum standards for bicycle lights
52. Consider whether compulsory fixed bicycle lights would improve road safety
53. Cyclists' safety must be included in local-authority planning
54. Serious safety issues and potential improvements regarding road junctions must be identified
55. Automated checkpoints directed against drivers who jump red lights if the trial project yields positive results
56. Continued establishment of roundabouts at dangerous road junctions
57. Speed limits at road junctions on primary roads
58. Stop signs at road junctions without traffic lights where many accidents occur due to failure to observe one's duty to give way to approaching traffic
59. Modernisation of road junctions with traffic lights, e.g. through greater signal visibility
60. Systematic identification of black spots
61. More research and development
62. An Accident Investigation Board for road accidents

Initiative cost-effectiveness



The individual measures are represented by a short line segment. The measures are listed with the most cost-effective initiatives at the bottom of the curve. As the curve shows, the cost-effectiveness in terms of injuries prevented per DKK is greater where the line segment is very vertical.

The curve illustrates the cheapest ways to achieve a reduction in the number of injuries on Danish roads. It also shows how to prevent the greatest number of personal injuries by means of a given investment.

Two things must be borne in mind as regards efforts directed at cyclists. Firstly, many general measures have good effects on accidents involving cyclists. Secondly, many cyclists' accidents are not included in the official accident statistics. Hence, every bicycle accident prevented should by rights count for more than other types of accident.

Cost and effects - by state, county, and local authorities

Measure	Target group	Effect (per year)				State effect (per year)			County effect (per year)			LA effect (per year)		
		Kld	SI	LSI	PI	Kld	SI	LSI	Kld	SI	LSI	Kld	SI	LSI
SPEED														
Automated speed checks	All	36	247	324	608	5	22	31	14	68	108	17	157	186
Speed limits on low-std. Primary roads	Accidents on narrow (old) 1980s rural roads	4	9	12	25	0	0	1	1	3	5	2	6	7
Local speed limits/urban areas	Accidents on local roads in urban areas	8	109	125	242	0	1	0	0	4	8	8	105	116
Traffic roads in urban areas	Motor-vehicle accidents in urban areas	12	140	180	332	1	4	4	2	22	38	10	114	137
Speedometers	High-speed accidents	2	22	26	50	0	0	1	0	2	3	2	19	22
Stricter punishment for speeding	High-speed accidents	12	83	108	203	2	7	10	5	23	36	6	52	62
Car engineering - speed limiting dev.	Speeding accidents	36	208	264	507	6	26	36	18	80	112	12	102	116
ALCOHOL														
Alcohol campaign, checks, info	Drink-driving accidents	31	137	172	340	3	15	20	14	48	73	14	74	80
'Say No' campaign ('Guardian Angels')	Acc. w/m drunk drivers u/25	9	44	64	117	0	3	6	5	15	26	4	26	32
Measures against drug driving	Accidents w/drivers under the influence of drugs	2	20	28	50	0	1	1	1	5	8	1	14	19
CYCLISTS														
Increased cycling-helmet usage	Head injuries among cyclists	4	17	0	20	0	0	0	1	3	0	2	13	0
Reflector tabs on bicycles	Cyclists in the dark	1	14	17	32	0	0	1	0	2	4	0	12	13
Path planning	Cyclists	1	10	15	26	0	0	1	1	4	2	1	6	13
Recessed stop lines	Cyclists in 312 accidents	1	11	14	26	0	0	2	1	3	5	0	8	8
Cyclists' crossings at junctions	Cyclists going straight through junctions	0	7	0	8	0	0	0	0	1	0	0	6	0
JUNCTIONS														
Stop signs	Accidents inv. duty to give way	2	10	14	26	0	1	2	1	4	7	1	5	5
Red light jumping	Red light accidents, urban	2	35	52	89	0	4	7	1	10	19	2	22	25
Dangerous junctions without tr. lights	Junction accidents	4	30	44	79	1	2	4	2	11	20	2	17	21
Dangerous junctions with traffic lights	Junction accidents	1	15	21	37	0	1	2	0	4	8	1	9	11
Speed limits at junctions	Junction accidents w/vehicles going ← 60 km/hr	10	37	62	109	2	5	9	6	27	45	2	6	8
Black-spot efforts - state/county roads	All accidents in/at black spots	18	107	149	275	5	26	35	14	81	114	0	0	0
Black-spot efforts - municipal roads	All accidents in/at black spots	35	212	242	489	0	0	0	0	0	0	35	212	242
Roundabouts	Junction accidents	6	60	115	182	1	8	16	3	25	59	2	27	40
Road safety audit	All accidents on new roads	46	196	245	487	7	21	28	21	65	91	18	110	125
STRETCHES														
Fixed objects	All solo accidents	4	19	23	46	1	2	4	2	6	7	2	11	12
Improved road lighting	Accidents in the dusk/dark w/lighting	3	39	44	86	0	3	4	1	7	11	2	29	29
New road lighting	Accidents in darkness w/o lighting	9	20	22	51	1	3	4	5	11	11	2	6	7
Curve reconstruction/signposting	Curve accidents	9	50	51	110	1	3	3	4	18	16	4	30	32
Grey stretches (the Route 9-method)	All accidents on such stretches	7	35	46	88	0	0	0	7	35	46	0	0	0
New standard intersections, rural areas	Accidents on stretches in the countryside	30	113	121	264	4	14	14	26	100	107	0	0	0
Median strips	Accidents with oncoming traffic, rural areas	4	8	8	20	1	1	1	4	7	7	0	0	0
Crossing facilities for pedestrians	Pedestrian accidents when crossing	1	12	7	21	0	0	0	0	1	1	1	11	7
Crossing facilities for pedestrians	Other accidents at these places	1	24	27	52	0	0	0	0	3	4	1	20	23
Car technology - 'keep your distance'	Rear-end collisions	1	14	21	36	1	5	8	0	4	9	0	5	4
ROAD USERS														
Increased seatbelt usage, front seat	Accidents with front-seat car passengers	76	290	285	651	16	36	37	37	126	124	23	128	124
Increased seatbelt usage, backseat	Accidents with backseat car passengers	5	38	50	93	2	8	10	2	18	21	1	11	20
Pedestrian reflector tabs	Pedestrian accidents in the dark (no lighting)	4	8	5	17	0	1	0	3	4	2	1	4	3
'Safety through Conversation'	Accidents involving lorries	9	32	34	75	2	6	6	5	15	19	2	10	9
Enterprise plans	All accidents	3	25	32	60	1	3	4	1	9	13	1	13	15
Total														
	Basis: 1998	499	4071	5104	9674	79	434	589	229	1350	1901	191	2289	2612
	Effect: Sum total of individual measures	451	2506	3073	6031	62	233	309	209	874	1191	180	1399	1574
	Per cent WITHOUT corr. for overlapping and traffic	90%	62%	60%	62%	79%	54%	52%	91%	65%	63%	94%	61%	60%
	Effect: corrected for overlapping	301	1849	2292	4441	45	178	240	134	604	846	122	1066	1206
	Per cent WITH corr. for overlapping	60%	45%	45%	46%	57%	41%	41%	59%	45%	45%	64%	47%	46%
	Overlapping	30%	16%	15%	16%	22%	13%	12%	32%	20%	18%	31%	15%	14%
	Effect corrected for overlapping and traffic growth	53%	39,9%	39%	40%	50%	36%	36%	51%	39%	39%	56%	41%	41%
	- do. for total Deaths + Serious Injuries	41,3%				38%			41%			42%		

	DKK million, total Invest. per year operation Total/year				DKK million, LA Invest. per year operation Total/year				DKK million, COUNTIES Invest. per year operation Total/year				DKK million, STATE Invest. per year operation Total/year				DKK million, PRIVATE Invest. per year operation Total/year				% LA	% Coun- tries	% State
Automated speed checks	60	5	90	95	0	0	0	0	0	0	0	0	60	5	90	95	0	0	0	0	0%	0%	100%
Speed limits on low-std.																							
Primary roads	46	4	0	4	37	3	0	3	9	1	0	1	0	0	0	0	0	0	0	0	80%	20%	0%
Local speed limits/urban areas	224	19	0	19	224	19	0	19	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%
Traffic roads in urban areas	1672	139	0	139	836	70	0	70	669	56	0	56	167	14	0	14	0	0	0	0	50%	40%	10%
Speedometers	40	3	6	9	10	1	2	2	20	2	3	5	10	1	2	2	0	0	0	0	25%	50%	25%
Stricter punishment for speeding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	10%
Car engineering - speed limiting dev.	850	71	7	78	0	0	0	0	0	0	0	0	85	7	1	8	765	64	6	70	0%	0%	10%
Alcohol campaign, checks, info	30	3	51	54	0	0	15	15	0	0	12	12	0	0	24	24	30	3	0	3	30%	23%	47%
'Say No' campaign																							
('Guardian Angels')	0	0	6	6	0	0	1	1	0	0	3	3	0	0	2	2	0	0	0	0	10%	50%	40%
Measures against drug driving	2	0	5	5	0	0	0	0	1	0	1	1	2	0	4	4	0	0	0	0	0%	25%	75%
Increased cycling-helmet usage	6	1	4	5	1	0	1	1	1	0	1	1	4	0	3	3	0	0	0	0	17%	17%	66%
Reflector tabs on bicycles	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0%	0%	100%
Path planning	100	8	0	8	90	8	0	8	5	0	0	0	5	0	0	0	0	0	0	0	90%	5%	5%
Recessed stop lines	19	2	0	2	14	1	0	1	3	0	0	0	2	0	0	0	0	0	0	0	75%	15%	10%
Cyclists' crossings at junctions	15	1	0	1	11	1	0	1	2	0	0	0	2	0	0	0	0	0	0	0	75%	15%	10%
Stop signs	3	0	0	0	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	25%	25%	50%
Red light jumping	83	7	1	8	0	0	0	0	0	0	0	0	83	7	1	8	0	0	0	0	0%	0%	100%
Dangerous junctions without tr. lights	396	33	0	33	198	17	0	17	166	14	0	14	32	3	0	3	0	0	0	0	50%	42%	8%
Dangerous junctions with traffic lights	200	17	0	17	100	8	0	8	80	7	0	7	20	2	0	2	0	0	0	0	50%	40%	10%
Speed limits at junctions	5	0	0	0	1	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	20%	40%	40%
Black-spot efforts - state/county roads	392	33	0	33	0	0	0	0	294	25	0	25	98	8	0	8	0	0	0	0	0%	75%	25%
Black-spot efforts - municipal roads	412	34	0	34	412	34	0	34	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%
Roundabouts	364	30	0	30	164	14	0	14	146	12	0	12	55	5	0	5	0	0	0	0	45%	40%	15%
Road safety audit	228	19	0	19	68	6	0	6	68	6	0	6	91	8	0	8	0	0	0	0	30%	30%	40%
Fixed objects	88	7	0	7	57	5	0	5	18	1	0	1	13	1	0	1	0	0	0	0	65%	20%	15%
Improved road lighting	600	50	0	50	450	38	0	38	120	10	0	10	30	3	0	3	0	0	0	0	75%	20%	5%
New road lighting	720	60	33	93	216	18	10	28	396	33	18	51	108	9	5	14	0	0	0	0	30%	55%	15%
Curve reconstruction/signposting	79	7	0	7	47	4	0	4	28	2	0	2	4	0	0	0	0	0	0	0	60%	35%	5%
Grey stretches (the Route 9-method)	336	28	0	28	0	0	0	0	336	28	0	28	0	0	0	0	0	0	0	0	0%	100%	0%
New standard intersections, rural areas	792	66	0	66	0	0	0	0	673	56	0	56	119	10	0	10	0	0	0	0	0%	85%	15%
Median strips	65	5	0	5	0	0	0	0	55	5	0	5	10	1	0	1	0	0	0	0	0%	85%	15%
Crossing facilities for pedestrians	12	1	0	1	9	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	80%	20%	0%
Crossing facilities for pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80%	20%	0%
Car technology - 'keep your distance'	373	31	5	36	0	0	0	0	0	0	0	0	37	3	1	4	335	28	5	32	0%	0%	100%
Increased seatbelt usage, front seat	400	33	4	37	0	0	1	1	0	0	1	1	0	0	2	2	400	33	0	33	30%	30%	40%
Increased seatbelt usage, backseat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30%	30%	40%
Pedestrian reflector tabs	0	0	3	3	0	0	0	0	0	0	2	2	0	0	1	1	0	0	0	0	10%	60%	30%
'Safety through Conversation'	0	0	4	4	0	0	0	0	0	0	1	1	0	0	3	3	0	0	0	0	0%	20%	80%
Enterprise plans	0	0	10	10	0	0	3	3	0	0	3	3	0	0	5	5	0	0	0	0	25%	25%	50%
	8612	229		918				278				302				226				112			

	Expenditure, DKK mil./year	Effect, deaths + s.i.
Automated speed checks	95	284
Speed limits on low-std. Primary roads	4	13
Local speed limits/urban areas	19	117
Traffic roads in urban areas	139	152
Speedometers	9	24
Stricter punishment for speeding	0	95
Car engineering - speed limiting dev.	78	243
Alcohol campaign, checks, info	54	168
'Say No' campaign ('Guardian Angels')	6	53
Measures against drug driving	5	22
Increased cycling-helmet usage	5	20
Reflector tabs on bicycles	0	15
Path planning	8	11
Recessed stop lines	2	12
Cyclists' crossings at junctions	1	8
Stop signs	0	12
Red light jumping	8	37
Dangerous junctions without tr. lights	33	35
Dangerous junctions with traffic lights	17	16
Speed limits at junctions	0	47
Black-spot efforts - state/county roads	33	125
Black-spot efforts - municipal roads	34	247
Roundabouts	30	66
Road safety audit	19	242
Fixed objects	7	23
Improved road lighting	50	42
New road lighting	93	29
Curve reconstruction/signposting	7	59
Grey stretches (the Route 9-method)	28	42
New standard intersections, rural areas	66	143
Median strips	5	12
Crossing facilities for pedestrians	1	14
Crossing facilities for pedestrians	0	25
Car technology - 'keep your distance'	36	15
Increased seatbelt usage, front seat		
Increased seatbelt usage, backseat	0	42
Pedestrian reflector tabs	3	13
'Safety through Conversation'	4	41
Enterprise plans	10	28

