

Safety report for the railways 2010

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Foreword

The Danish Transport Authority works to maintain safety on the railways while supporting passenger growth. Safety management is one of the watchwords. All railway undertakings and infrastructure managers now have a safety management system in operation. For some this is a brand new initiative – but many have already experienced the advantages such a system brings.

This year's safety report describes developments in railway safety in 2010 with a focus on the Authority's supervision of undertakings' safety management and risk management processes.

The Danish Transport Authority's target is to achieve a higher degree of self-management in undertakings. Where undertakings can demonstrate that risk management processes and risk assessment methods are functioning properly, they will also have more scope to manage safety themselves.

This movement is supported by methods and guidelines as to how undertakings can gain greater scope to optimise safety and efficiency. To support undertakings, in 2010 the Danish Transport Authority produced guidelines on the use of comprehensive risk assessments when approving railway systems. The methods will be developed further over the coming year.

The Danish Transport Authority hopes that this year's safety report can contribute to inspiration and exchange of experience in the Danish railway sector. The report will also be used to exchange experience among the EU Member States and will be submitted to the European Railway Agency.

Happy reading!

Jesper Rasmussen

Director of Safety

Summary

The target for railway safety has been sustained...

The national safety target for the railway states that safety must as a minimum be kept at the 2004 level of 0.3 fatalities and weighed serious injuries per 1 million train kilometres. The target was upheld in 2010 where the number of fatalities and weighed serious injuries was 0.17 per 1 million train kilometres.

In 2010 there were 22 significant accidents (with operational delays, significant property damage, serious injury or death). This is a decrease compared to last year, and the 5-year average for significant accidents has also fallen. The decrease in the number of accidents is caused by a decrease in accidents to persons caused by rolling stock in motion. In 2010 the number of accidents caused by rolling stock in motion has reached the lowest number in 10 years.

2010 was also the year where the European Railway Agency (ERA) published the first draft for a common European safety target. The European acceptance level is 2.5 fatalities and weighed serious injuries per 1 million train kilometres, which is approximately 10 times as much as the Danish safety level – however Denmark must continue to maintain its high safety level.

...level crossing safety remains an area of focus

Eight people were seriously injured and ten killed in railway accidents in 2010. Only one passenger was seriously injured and for the fifth consecutive year no passengers were killed in railway accidents, and only one passenger was seriously injured. Nobody working at the railway was seriously injured or killed in railway accidents.

There has been an increase in the number of injuries at level crossings compared to the 5-year average of approximately two seriously injured per year. The safety of level crossings will remain a focus area, and cooperation in the industry can contribute to identify why and when accidents occur in level crossings.

The safety level must be maintained through more safety management...

The objective of the Danish Transport Authority is to achieve a higher degree of autonomy in the railway undertakings and infrastructure managers. A well tuned safety management system helps to “manage” and control risks in a company and is therefore a prerequisite for self-management.

In 2010 the last of the existing railway undertakings obtained a certified safety management system. This means that by the end of 2010 there were 15 railway undertakings with a safety certificate (three of them non-Danish) and nine cleared infrastructure managers.

Safety management is still something relatively new to the railway undertakings, but after the first companies have gathered experience, they have begun to see what benefits it offers.

... and risk assessment methods are key tools

In 2010 a European Commission Regulation¹ on risk assessment concerning the railway undertakings was implemented. Initially the regulation covers construction and the renewal of technical systems.

In all technical systems, risk assessments must form the basis on which the documentation and application of authorization are built. The point is that conducting a proper risk assessment and risk management of the railway construction, makes it possible to avoid substantial risks in a cost-effective way.

In 2010 the Danish Transport Authority published a guide to holistic risk assessment. The guide provides methods for how the company, within limits, may consider safety as an integral whole.

The requirement for systematic use of risk assessments on the railroad must be supported by assessor ratings. The assessor must make an independent and competent evaluation of the applicant's risk assessment and risk management in all project stages. The Assessor requirement is introduced generally in 2012. A special theme chapter of this report illustrates how to use the assessor.

New strategy for risk based audits and inspections...

The Danish Transport Authority supervises how the company complies with relevant regulations and requirements on safety management. In 2010, the Danish Transport Authority prepared a supervision strategy, which spells out how the Danish Transport Authority will conduct risk-based supervision and implement a wide variety of monitoring methods.

The strategy is to exploit the benefits of various monitoring methods to achieve the best possible effect of the Danish Transport Authority's surveillance efforts. The monitoring activities will henceforth be controlled through effect measurements and the effort must be emphasized by measurements of the actual confrontation time in companies (e.g. days of audit).

In 2010 49 inspections (audits and inspections) were carried out on the Danish railway. Confrontation time of completed audits in 2010 amounted to 94 days of audit. The Danish Transport Authority had a special focus on the companies' ability to manage maintenance and training of train drivers in 2010.

...must highlight input and results

The Danish Transport Authority issued two orders, two bans and 30 deviations at the oversight. Prohibitions and orders were issued when

¹ COMMISSION REGULATION (EC) No 352/2009 on the adoption of a common safety method on risk evaluation and assessment (CSM-RA).

vehicles were used for tasks that they were not intended for, and in cases where the maintenance plans for the vehicles were not met.

Most deviations were found within the subjects: implementation of standards and rules for the safety activities within the companies, implementation of new regulatory requirements in the safety management system (including changes and risk assessments) and documentation of maintenance.

Furthermore four themes that were to be uncovered at the inspections of the year were identified: Assessment of behaviour in the cab, level crossings, dangerous goods and emergency response management (continuing in 2011).

The Danish Transport Authority found that the railway companies are aware of the need to control the conditions in the cab, e.g. the use of various media. Risk assessments in this area however, are not yet a developed part of the risk management of the railway undertakings.

Level crossings were also a theme at this year's audits and inspections. It was estimated that Banedanmark's monitoring and maintenance of level crossings follow a systematic, well documented and well implemented process.

The Danish Transport Authority's general assessment from the inspections of transports of dangerous goods was that there are many freight trains carrying dangerous goods, where the wagon lists do not match the actual location of the wagons. However, there was not found any serious flaws in the management of dangerous goods. More inspections will be carried out in 2011 in order to uncover the risk minimizing activities of railway infrastructure managers.

Areas of focused efforts in 2011

Safety management is based on the principle of constant management of safety and introduction of improvements through ongoing evaluation of action plans and targets for the company. This "evaluation culture" must be further developed on the railway, thus ensuring that the safety management system is actually effective. The Danish Transport Authority will have company management review as an area for monitoring in 2011.

Level crossings remain a vital area of focused effort. The Danish Transport Authority will in 2011 draft regulation to clarify the division of responsibility concerning level crossings. Safety measurements will support an effective and safe traffic flow on both road and rail.

In 2011 the Danish Transport Authority will revise the order on authorization of railway vehicles and railway infrastructure. This will establish clear guidelines for the European requirements on risk assessment, use of assessor etc.

International technical standards for interoperability (TSI) must be implemented appropriately in the current Danish system, with the goal of developing an efficient pan-European railway.

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Chapter 1. Accidents and incidents

For many years, there have been so few accidents involving passengers and employees that the average is close to zero. Accident data for 2010 show that safety levels on Danish railways are generally high.

Accidents, incidents and safety irregularities

There are approximately 2700 km of railway line in Denmark. A large part is equipped with effective safety systems that prevent serious accidents – especially on main lines, where traffic flow is fast and capacity is greatest (see also figures for the rail system in Annex 1).

Railway undertakings and infrastructure managers are continually following up on accidents, precursors of accidents and safety irregularities that occur in their area.

It is part of the undertakings' safety management system to carry out an investigation when something goes wrong. In the most serious cases, the Accident Investigation Board for Civil Aviation and Railways helps establish the chain of events and possible causes of the fault in the system.

Once a year all the data are passed on to the Danish Transport Authority, which analyses developments in rail safety nationwide. The results are set out in this chapter of the annual safety report.

All accidents, precursors of accidents and safety irregularities are reported in accordance with the "Reporting Executive Order"². The definitions used are listed in Annex 3. Annex 4 contains an overview of the data. To minimise statistical uncertainty when indicating relatively small data volumes, the five-year average is used to assess developments in railway safety.

Significant accidents

The number of significant accidents³ fell to a total of 22 in 2010. As can be seen in figure 1, there was a drop in the five-year average, despite a slight increase in the number of significant accidents in 2009. The five-year average is 0.3 significant accidents per million train-km in 2010.

² Executive Order No 575 of 25 May 2010 concerning the reporting of data on accidents, precursors to accidents and safety irregularities, etc. to the Danish Transport Authority.

³ Significant accidents are train accidents involving damage of over DKK 1.2 million, death or serious injury, or delays to train operations of more than six hours.

Figure 1. Significant accidents

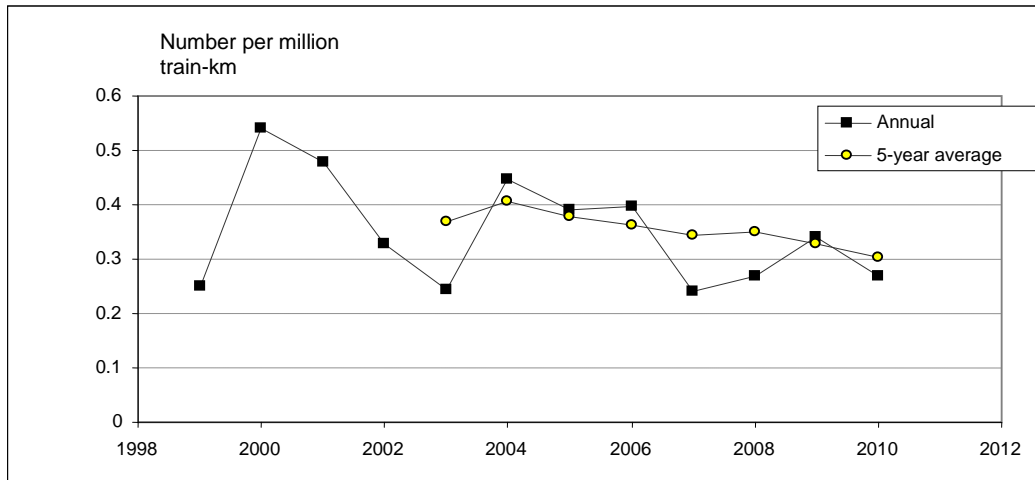


Figure 1. Significant accidents are train accidents involving damage of over DKK 1.2 million, death or serious injury, or delays to train operations of more than six hours.

The number of significant accidents fell because the number of collisions with persons and the number of other significant accidents declined. Collisions with persons remain the most frequent type of accident, but the number is below the five-year average – the lowest number in more than 10 years.

Accidents at level crossings rose in relation to the five-year average, and therefore account for a greater proportion of all significant accidents than previously.

Figure 2. Significant accidents broken down by type of accident

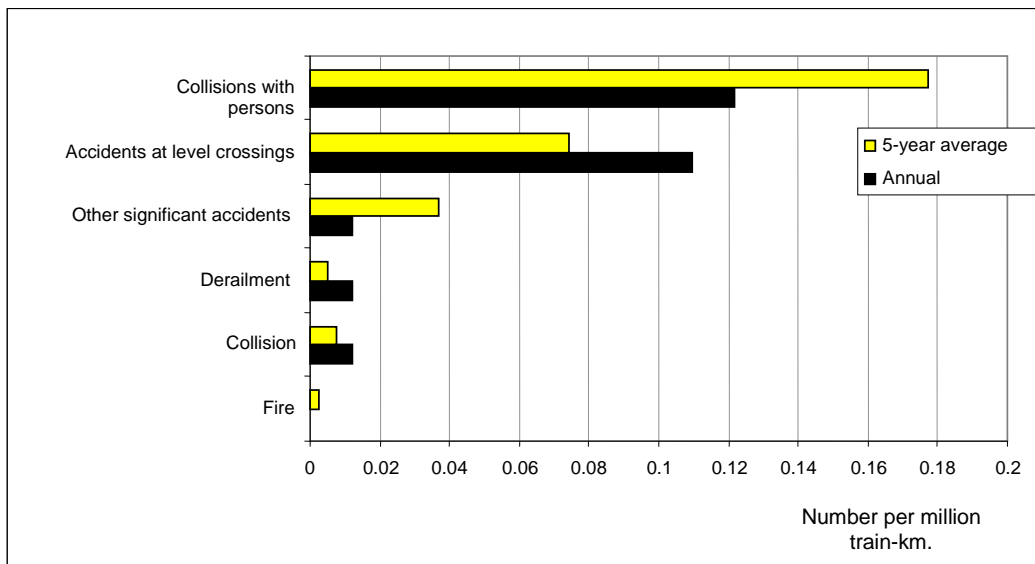


Figure 2. Accident types are given per million train-km for 2010 and as a five-year average in the period 2006-2010.

People standing too close to the track, with the risk of being knocked down, is a daily occurrence. In the past three to four years, the focus has been on measuring the number of so-called “near-misses”. A near-miss is viewed as a precursor to an accident – events where injury almost happened.

According to data from 2010, the ratio of significant accidents with personal injury to "near-misses" is approximately 1:15 at level crossings⁴. For other collisions with persons that occur on railway lines and in and around stations, the ratio is approximately 1:33. Analysis of accidents and the many near-misses can help map how and why accidents happen.

In 2010, no accidents caused several instances of serious personal injury at the same time. There was one collision and one derailment, both types of accidents which have the potential to cause extensive damage, but neither caused any personal injury. The number of collisions and derailments is a fraction over the five-year average, while other significant accidents were down on previous years. In 2010 there were no fires that could be classified as significant accidents.

The change in the different types of accident is an expression of the fact that there is only a small volume of data. Nevertheless, the annual change corresponds to a fall or rise of approximately one to two significant accidents in comparison with the average.

Safety target for the railways

The safety target for the railways has been set on the basis of the average number of "significant accidents involving persons", taking 2004 as the base year. Significant accidents involving persons are a weighted total of the number of persons killed (weighted 1/1) and seriously injured (weighted 1/10). The safety target can be used to assess whether safety on the railways is acceptable.

Compliance with the safety target is assessed on the basis of changes in the number of significant accidents involving persons. Significant accidents involving persons are given as a five-year average and scaled up to train-km travelled. Figure 3 shows a downward trend in the five-year average from 2004 to 2010.

Figure 3. Significant accidents involving persons 2001-2010

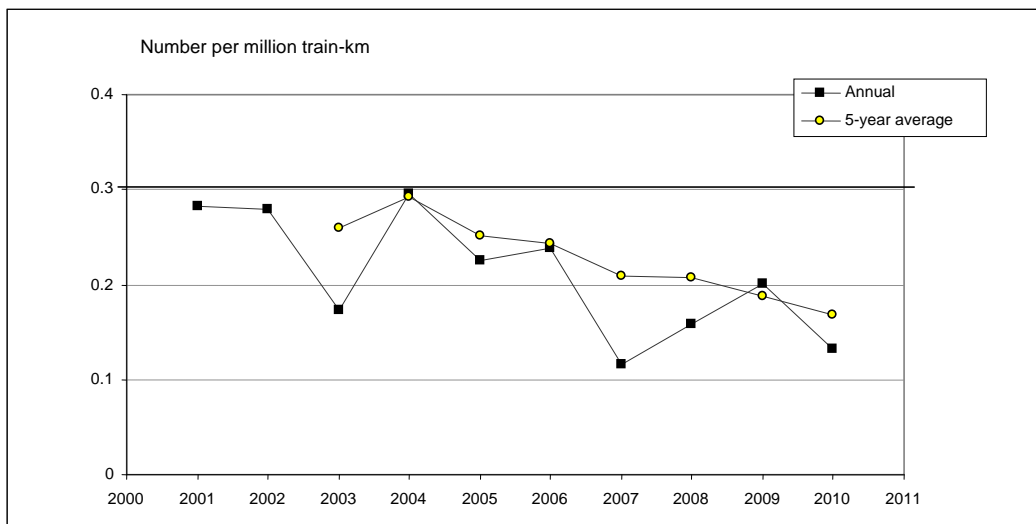


Figure 3. "Significant accidents involving persons" are a weighted total of the number of persons killed (weighted 1/1) and seriously injured (weighted 1/10). The statistics cover all groups of persons excluding suicides.

⁴ See overview of safety irregularities in Annex 4, table 11.

The national safety target is still that the number of significant accidents involving persons on the railway should be less than 0.3 per million train-km on average. The target was met in 2010.

In 2010, the average number of significant accidents involving persons was 0.17 per million train-km.

The number of significant accidents involving persons in 2010 was below the level of the previous year, and also well below the national safety target of 0.3 significant accidents per million train-km.

Breakdown of accidents involving persons

The number of personal injuries in railway accidents in Denmark in 2010 was very low compared with previous years. In all, ten people were killed and eight seriously injured – excluding suicides. None of the deaths involved passengers or employees.

As in the previous year, four people were killed on level crossings in 2010. In addition, six people were killed while on railway property without permission. This was a slight drop compared to last year.

In total, eight people were seriously injured in railway accidents. Of these, four were using level crossings, three were on railway property without permission and one was a passenger.

Both serious injuries and deaths fell compared with 2009.

The number of deaths was 0.12 people per million train-km in 2010.

The number of serious injuries was 0.10 people per million train-km in 2010.

The fall in the number of accidents involving persons was due to a sharp fall in the number of collisions with persons on railway property without permission.

Table 1, which contains an overview of the most recent five-year period, shows that collisions with persons accounted for 57% of the total number of significant accidents and 61% of personal injuries. Both are down on past figures, but still account for the highest proportion of significant accidents and personal injuries.

Table 1. Significant accidents involving persons broken down by type of accident 2006–2010

Type of accident	Significant accidents	Significant accidents (%)	Significant accidents involving persons	Significant accidents involving persons (%)
Collisions with persons	72	57	41	61
Accidents at level crossings	30	24	22	32
Other	15	12	5	7
Dangerous goods	4	3	0	1
Collision of trains	3	2	0	0
Derailment	2	1	0	0
Fire	1	1	0	0
Total:	127	100	68	100
Average per year:	25		13.7	

Table 1. The table shows accidents involving persons and significant accidents broken down by type of accident over a five-year period. Significant accidents are those where significant material damage or injury occurred. Significant accidents involving persons are a weighted total for persons killed (weighted 1/1) and seriously injured (weighted 1/10), but excluding suicides.

Conversely, there was a rise in the proportion of accidents at level crossings. One of these was a tragic accident in 2010 on the Svendborg line, where an 11-year-old boy was killed. Following the accident, Banedanmark was commissioned to risk-screen peri-urban level crossings, to assess the need for more safety measures.

In 2010, accidents at level crossings accounted for approximately one quarter of the total number of significant accidents, and one third of personal injuries. The rise in the number of accidents at level crossings corresponds to an additional two people per year being seriously injured at level crossings.

Collisions with persons and suicides on the railway

Suicide is not viewed as a railway accident in the traditional sense. This is because the causes of suicide are not directly related to the way railways are operated. Suicide on the railways is no different from suicide in other locations, and should be prevented in the same way as other suicides.

The number of suicides is typically more than twice the total number of deaths caused by accidents on the railway. In 2010 the number of suicides fell from 32 to 23. Nevertheless, the five-year average still shows an upward trend.

Figure 4. Number of suicides 2001-2010

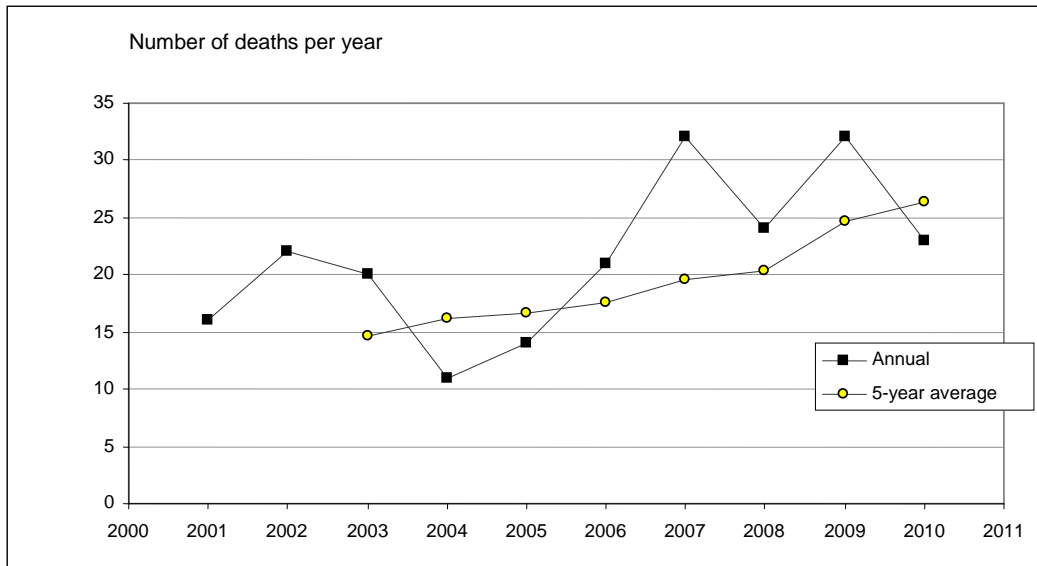


Figure 4. Number of suicides resulting in a fatality. Suicides are recorded on the basis of witness statements and police decisions.

Suicide statistics entail some uncertainty. Data on suicides on the railways was first collected systematically in 2006 – before then the data most likely contained inaccuracies.

A further source of uncertainty is that it is not always possible to decide whether, when an accident first happens, it involves a suicide or a collision with a person. It is therefore conceivable that there is a link between the rise in the number of suicides and the decline in the number of collisions with persons, as can be seen from figure 5.

The decline in the number of collisions with persons in 2010 also caused the five-year average to fall slightly, to 0.18 per million train-km in 2010. The victims of such collisions are typically people who are on railway property without permission.

Figure 5. Number of collisions with persons 2001-2010

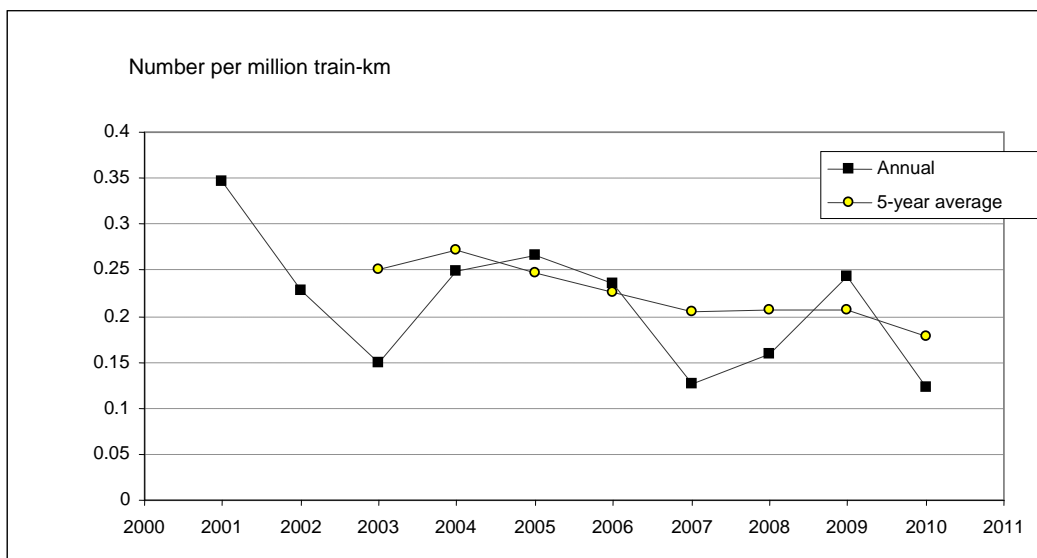


Figure 5. Number of significant accidents involving collisions with persons that resulted in either death or serious injury.

Suicide attempts and other types of collisions involving persons have an impact on the operation of the railways, and on the psychological working environment of train drivers.

Breakdown of injuries by group of persons

In 2010, passenger safety was extremely high. Just one passenger was seriously injured, after becoming trapped in a sliding door on a train, but no passengers were killed.

The number of accidents involving passengers displays a downward trend. On average there were 0.05 deaths and weighted serious injuries per billion passenger-km. This equates to between three and four serious injuries a year.

Figure 6. Significant accidents involving passengers 2001-2010

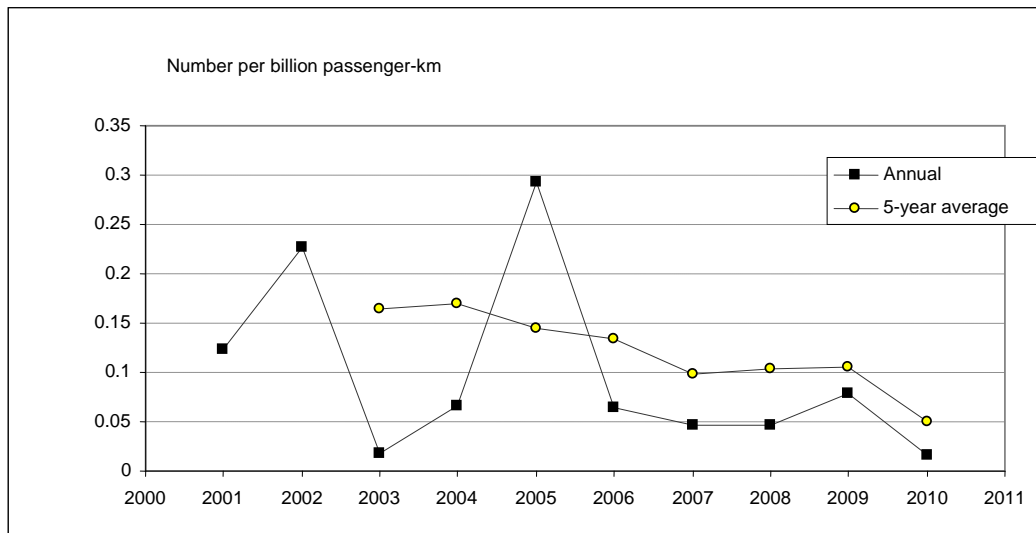


Figure 6. Significant accidents involving passengers are described in relation to passenger-km travelled. One passenger-km is the transporting of one passenger for one km and expresses the transport work performed.

For railway employees, safety was at its absolute highest in 2010, in that no employees were killed or seriously injured.

The groups of persons most vulnerable to railway accidents are, first, those on railway property without permission. These are followed by users of level crossings. As mentioned above, there were a total of ten deaths and seven serious injuries in these two groups in 2010. There was a rise in the number of deaths and serious injuries among users of level crossings, while the corresponding figure fell for people on railway property without permission.

For the fifth year in succession there were no passenger fatalities⁵, which gives a downward trend in the five-year average. Accidents involving employees continue to maintain a stable five-year average.

⁵ The statistics for 2009 recorded one passenger killed, but this was eventually corrected by the railway undertaking and infrastructure manager in question to one unauthorised person on railway property. The correction has been entered in the statistics for 2010.

Figure 7 shows a marked change in the number of accidents involving persons by types of person: level-crossing users, unauthorised persons on railway property and other, e.g. persons on platforms or people living near railway property. This reflects the fact that the method of calculation has changed. Previously the three types of person were in one group, but a new division allows the three types to be considered separately (definitions given in Annex 3). In recent years the figures have been extremely reliable, but caution should be exercised in attempting to discern trends.

Figure 7. Accidents involving persons broken down by groups of persons 2003-2010

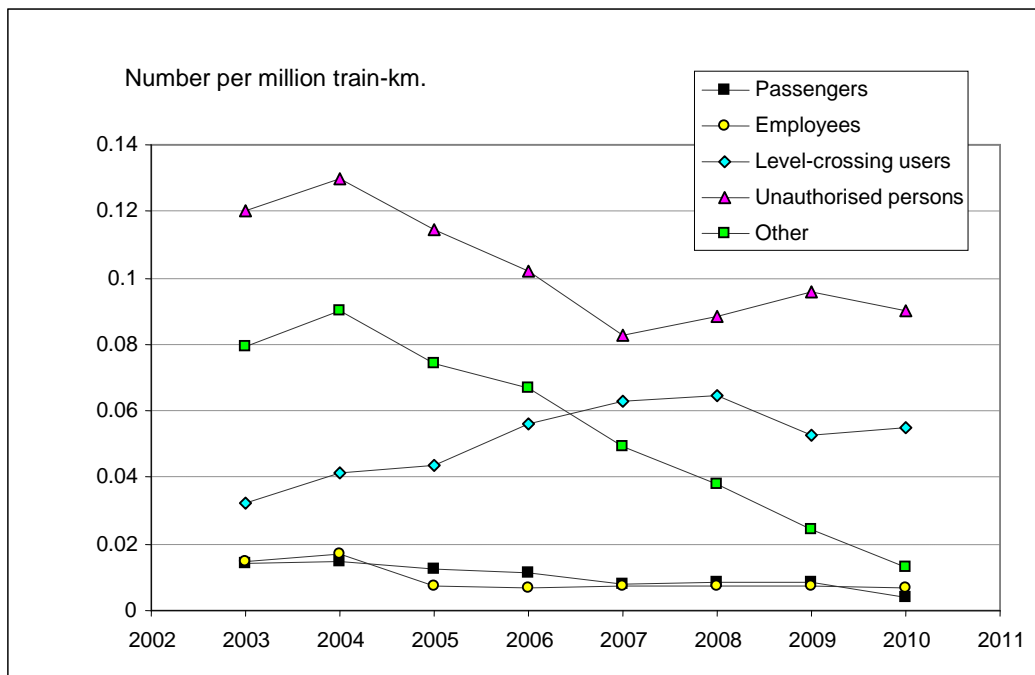


Figure 7. Accidents involving persons are given as the number of persons killed (weighted 1/1) and seriously injured (weighted 1/10). The statistics are given as five-year cumulative averages for all groups of persons excluding suicides.

It should be noted that the absolute figure for persons killed and seriously injured in railway accidents is very small. Major fluctuations can therefore be expected from year to year.

Minor accidents and incidents

A total of 487 minor accidents were recorded in 2010. Minor accidents are those not involving extensive material damage or serious personal injury. The figure is on a par with the previous year.

Collisions still account for most minor accidents. In 2010, the number of collisions was around one third of the five-year average, a significant drop. This could be due to a

misunderstanding of the definition used for collision⁶, which thus continues to be a significant source of error.

In addition, there was a slight decline in accidents at level crossings and derailments. There were slight increases for collisions involving persons, fire and other accidents. See figure 8.

Figure 8. Minor accidents broken down by type of accident

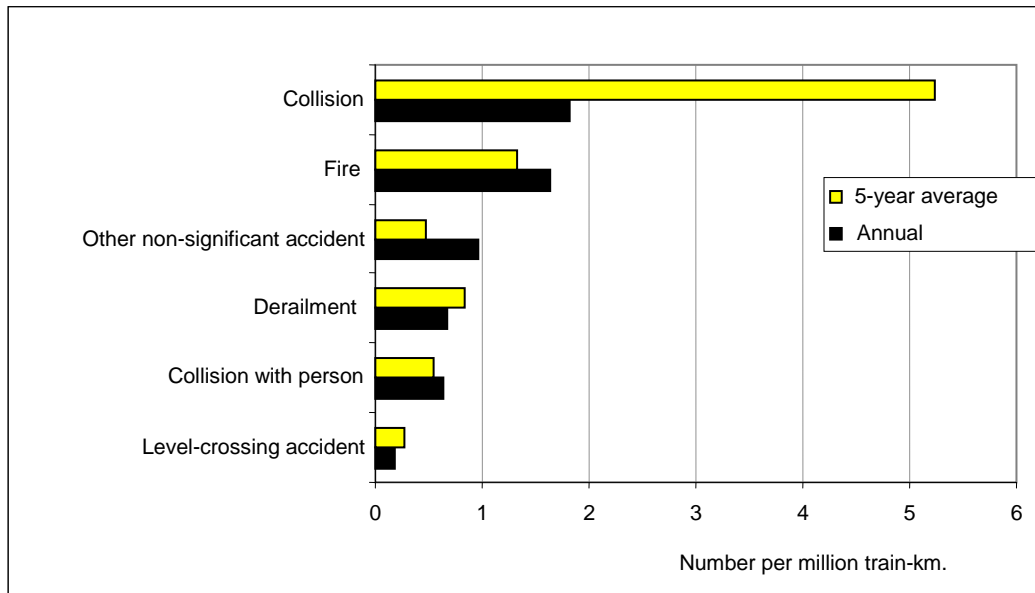


Figure 8. Minor accidents are those involving minor injuries or material damage of less than DKK 1.2 million. The types of accident are given per million train-km and as a five-year average for the period 2006-2010.

In 2010 there was a link between minor accidents and significant accidents in that where there was a rise in the number of minor accidents, there was a drop in the number of significant accidents. It is therefore difficult to deduce clear trends from the results.

594 precursors to accidents were recorded in 2010, on a par with the previous year. Precursors to accidents are lapses in safety that do not cause damage. They can be divided into five types: broken rails, track buckles, signals passed at danger, signal failure, and broken wheels and axles.

Signals passed at danger easily constituted the highest proportion of precursors to accidents (467 cases) in 2010, although this figure was down on previous years.

The next biggest proportion was signal failure (61 cases), followed by broken rails (49 cases). Of the five types of precursors to accidents, only the number of broken rails rose in relation to the five-year average.

⁶ Inasmuch as the causes of collisions are often attributable to vandalism, there has been a tendency for events to be mistakenly recorded as vandalism. In so doing, the cause is confused with the primary event, the accident. In future, the Danish Transport Authority intends to pay special attention to this source of uncertainty.

Figure 9. Precursors to accidents broken down by type

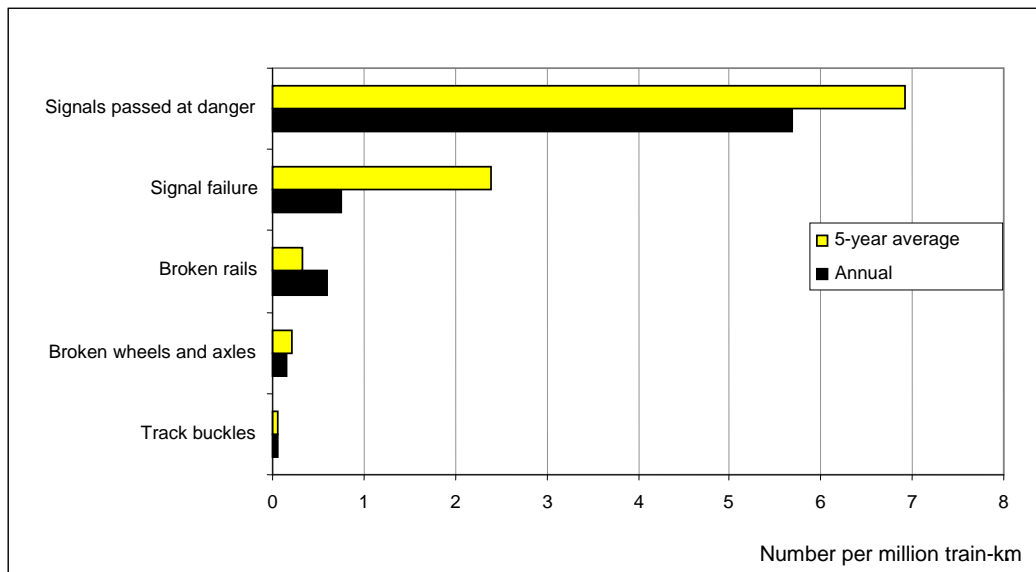


Figure 9. Precursors to accidents are given in relation to train-km travelled, and as a five-year average over the period 2006-2010. Precursors to accidents do not cause damage.

Accidents and incidents with dangerous goods

In 2010 there was one accident involving dangerous goods, resulting in a leak of approximately 800 litres of diesel oil. The spillage occurred in a shunting area while there was still snow and frost on the ground, which facilitated the clean-up. The specific circumstances surrounding the accident are being investigated.

There was one incident involving a vehicle carrying dangerous goods, but no dangerous goods leaked.

Railway safety in other countries

At European level there was one major serious accident in Belgium in 2010. This involved a head-on collision between two trains near Halle Station. Eighteen people were killed in the accident, and more than 80 were seriously injured. The accident shows that rail transport involves considerable risks that should be avoided if at all possible.

Investigations show that major serious accidents rarely have one single cause, but are the result of a chain of events and failures. Most causes can be traced back to organisational error and human factors. Often there are also precursors to accidents that should set alarm bells ringing if the safety management system is working properly.

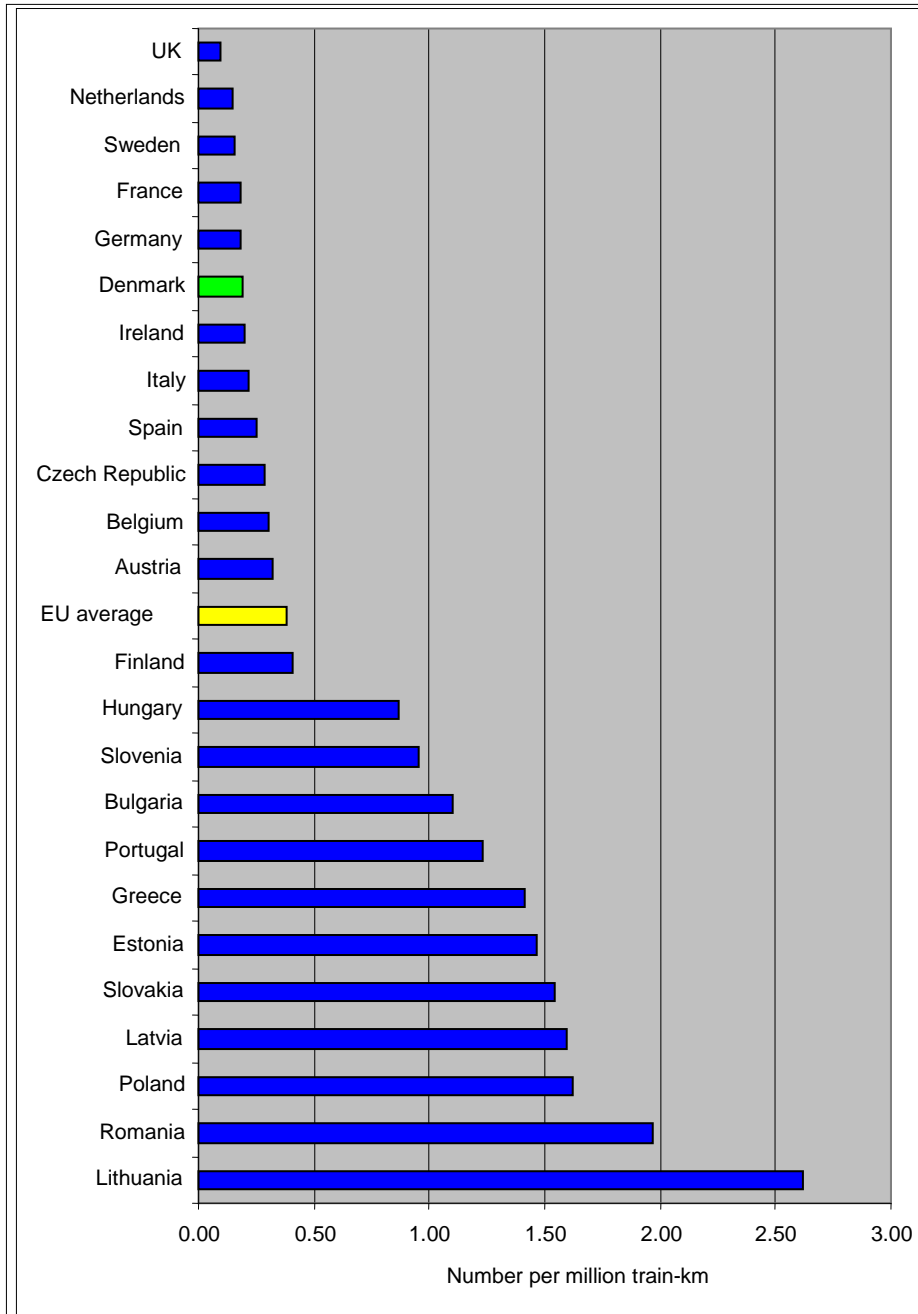
The EU's safety target

The European Railway Agency (ERA) publishes safety indicators and safety levels for EU Member States⁷. Comparison between the countries shows that Denmark has a very high level of safety, on a par with the neighbouring countries with which the country normally compares itself.

⁷ Railway Safety Performance in the European Union 2011, European Railway Agency. www.era.europa.eu

The safety level is given as the number of deaths and weighted serious injuries in the period 2006-2008. Figure 10 also shows the European average, which is 0.38 significant accidents involving persons per million train-km in this reporting period, twice the Danish level of approximately 0.19.

Figure 10. Significant accidents involving persons in the EU (2006-2009)



The safety level is given as the number of deaths and weighted serious injuries over a four-year period.
Source: Railway Safety Performance in the European Union 2011, European Railway Agency.

Common safety targets for the whole EU were adopted in 2010. The targets were set on the basis of the first four years of data collected at Community level⁸.

The common safety target in the EU is 2.5 accidents involving persons per million train-km. The basic data contain major uncertainties and the calculation is therefore seen as a first draft. The target will be revised in 2012, with the target slowly being adapted to the European average.

The Danish safety target is below the European target by a factor of approximately ten, and this Danish target will be preserved.

Comparison of safety for groups of persons

There are around 1460 deaths a year in train accidents in the EU. The breakdown by different groups of persons shows the same pattern in Denmark and the EU as a whole.

A significant proportion of the deaths involve people on railway property without permission and users of level crossings. Conversely, passengers, employees and others account for a relatively small group. Passengers are most frequently injured when boarding or alighting from trains.

Figure 11. Fatalities broken down by groups of persons

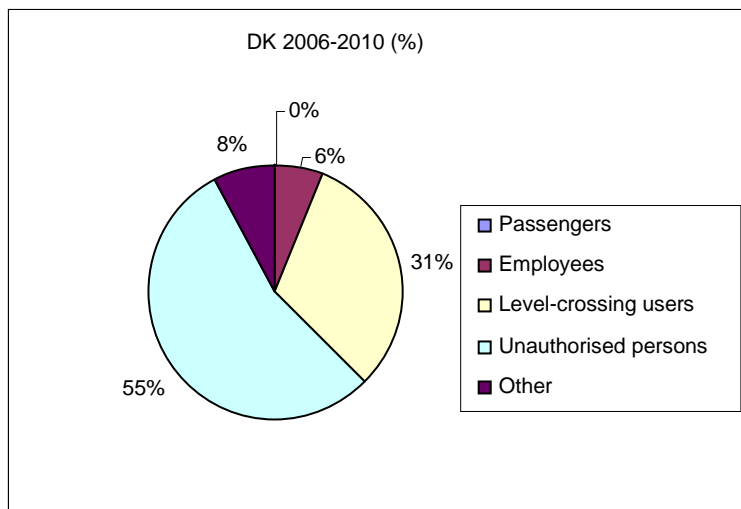


Figure 11. The calculation for the EU includes 5853 fatalities in the period 2006-2009. EU data for 2010 have not yet been published. The calculation for DK includes 64 fatalities in the period 2006-2010. This does not include suicides. Significant differences in calculation methods between EU countries mean that this calculation is subject to a certain degree of uncertainty.

Source: Railway Safety Performance in the European Union 2010, European Railway Agency and Danish Transport Authority.

There are only minor differences in the size of the individual groups of persons between the European and Danish calculations. The imbalance is due to the fact that data volumes in Denmark are extremely small – i.e. a minor fluctuation in the number

⁸ The common safety indicators (CSI) are reported, cf. Annex I to the Safety Directive. Published in Denmark in Order No 1293 of 23 November 2010

of employees killed comes through clearly in the statistics. It should also be noted that the European definitions were not used consistently in the reporting period.

Safety in connection with different forms of transport

Rail transport is extremely safe compared with other forms of transport. The number of serious accidents involving persons on the railways is approximately one fifth of the level for road transport.

Figure 12. Accidents involving persons on road and rail 2000 -2009

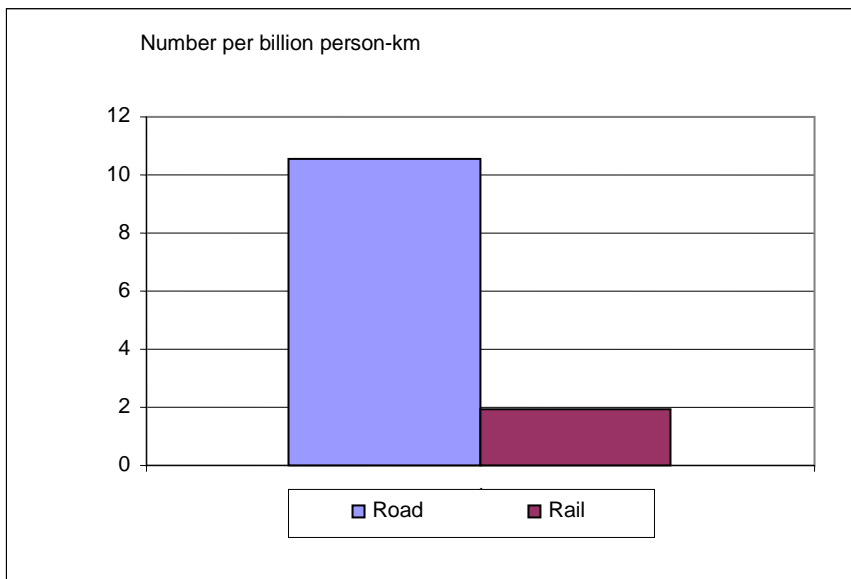


Figure 1. Accidents involving persons is the weighted total of the number of persons killed (weighted 1/1) and seriously injured (weighted 1/10) seen in relation to person-kilometres. For road traffic, 'seriously injured persons' are persons taken to accident and emergency departments/hospitals, whereas for the railway, seriously injured persons are those hospitalised for at least 24 hours. Accidents involving persons are therefore considered to be a shade high for road traffic. The table does not include suicides.

Source: Statistics Denmark, the Danish Road Directorate and Danish Transport Authority.

There are significant differences between road and rail traffic. On the roads there are several different types of road user in the same environment. Compared with trains, passenger cars are involved in more than 10 times as many accidents involving persons per passenger-km. Buses, however, are safer and roughly on a par with rail traffic.

Railways are relatively shielded from other road users. It is only at level crossings that trains cross the path of other road users. It is often other road users who are injured in railway accidents.

Chapter 2. Handling of railway safety 2010

A new supervision strategy is creating a link between input of supervisory resources, prioritisation of activities and achieving the desired effect – from a risk-based approach. Undertakings' safety management systems are new, and therefore there is still some way to go before they are fully operational.

New supervision strategy

In 2010 the Danish Transport Authority presented a new supervision strategy⁹. This new strategy builds on the existing basic elements of risk-based supervision, and the emphasis is on the auditing of undertakings' safety management systems, rather than actual technical inspections.

Carrying out risk-based supervision means that the Danish Transport Authority plans its supervision on the basis of a systematic and transparent risk assessment of undertakings' circumstances. The Authority is seeking to prioritise its resources in such a way that most effort goes into those undertakings that have the greatest potential risk, or where safety auditing is weakest.

As a starting point, the Danish Transport Authority wants to show confidence in undertakings, and reduce the amount of supervision where undertakings are able to demonstrate that they have a grip on safety. The new supervision strategy puts forward certain principles for how this can be achieved in practice.

Four general principles have been developed for how the Authority should carry out its supervisory work:

- Clear division of roles between undertaking and authority
- Effective utilisation of resources
- Transparent, high-quality supervision
- Documented effect of supervisory activities

The supervision strategy must help to maintain or ideally increase the ability of undertakings to manage their own risks.

The strategy describes the links between input and prioritisation of resources, as well as achieving the desired effect. The expected cause-effect chain must be measurable, so that it is possible to evaluate the impact of the supervisory work.

Effect targets

The Danish Transport Authority wants to put in place short and long-term effect targets. The long-term target is for the supervision of undertakings responsible for safety to help maintain railway safety in Denmark at a high level. Targets will be calculated and evaluated annually. Trends in accident patterns must be reflected in the prioritisation of supervision efforts in an attempt to arrest the trend and limit similar accidents in the future.

⁹ Strategi og praksis for tilsyn med jernbanevirksomheder [Strategy and practice for the supervision of railway undertakings], October 2010, Danish Transport Authority. See www.trafikstyrelsen.dk

The short-term effect target for supervisory activities is to maintain and ideally increase the ability of undertakings to manage their own risks. A culture of safety in undertakings helps reduce the likelihood of accidents.

Until further notice the short-term effect target will consist of a qualitative assessment. There are three key parameters: compliance with rules in undertakings, learning about risks and safety in undertakings, and an assessment of the effect of regulation by the authorities.

In 2011 the Danish Transport Authority intends to develop methods for carrying out more precise measurements of both short and long-term effect targets.

Supervisory practice

Undertakings must themselves demonstrate that they can manage their own safety. The overarching aim of the Danish Transport Authority's supervision of railway safety is to ensure that the principles of safety management are respected and documented.

Supervision involves checking that the applicable safety rules are being observed and are functioning as intended. Random tests can show whether undertakings have mastered the necessary safety-related recording and monitoring systems in relation to infrastructure, rolling stock, traffic, etc.

The emphasis in supervisory activities is on audits rather than actual technical inspections of undertakings' safety management systems. Looking forward, the Authority would like to use approximately 80 per cent of its supervisory resources to carry out audits, with the other approximately 20 per cent being used for inspections.

Audits tie in with the role of the Danish Transport Authority as a certifying body for undertakings' safety management systems, while inspections tie in with its role as a "classic" supervisory authority.

While inspections are relatively short and frequent, audits can take from one to ten days in the undertaking. The number of supervisory operations does not therefore reflect the effort expended. Henceforth, "the number of audit days" in the undertaking will be used as a measure of the resources employed on the supervisory operation.

A new supervision schedule will be published on 1 January each year. The Danish Transport Authority will strive to give notice of the supervisory operation in good time, to allow undertakings to prepare themselves. This often helps undertakings to focus on the essentials and develop their safety management system as required.

There may, however, be situations in which the nature or seriousness of the supervisory operation demands that the notice period be very short or that the supervisory operation be unannounced.

Procedure

Supervision of undertakings is carried out by skilled auditors, who assess the undertakings' management system on the basis of general objective criteria. In carrying out a supervisory operation, the senior supervisor may make use of relevant specialist experts in the Danish Transport Authority.

The Danish Transport Authority uses dialogue-based supervision, where there is an opportunity to gather experiences and opinions from the undertakings, but where there is also an opportunity to provide guidance.

The approach adopted for audits broadly follows the approach that is typical for other management systems, e.g. quality or environmental certification.

If the safety management system is not functioning effectively, the Danish Transport Authority issues an order or a ban. A ban on operation on a given stretch of line is only issued in situations where the safety conditions are clearly indefensible. In situations

where undertakings do not follow the applicable rules or procedures for their own safety management system the Danish Transport Authority notes the existence of a non-conformity.

Undertakings must address the underlying causes of the current order or ban. The actual follow-up of bans, orders and non-conformities is agreed in each case with the railway undertaking or railway infrastructure manager concerned.

Supervision of safety authorisations and certificates in 2010

The Danish Transport Authority's supervision schedule shows where and when supervisory operations are carried out, and indicates any supervisory topics with particular focus. The scope of the supervision and focus areas is defined in accordance with the undertaking's size and responsibilities, its accident data and also the Danish Transport Authority's own experience.

Supervision is always carried out when new certificates or authorisations are issued. In the five-year validity period, a series of follow-up supervisory operations are carried out to establish whether the safety management system is still effective.

Focus areas for 2010

The supervision schedule for 2010 included 33 planned supervisory operations, of which 29 were audits of safety certificates and safety authorisations and four involved special themed supervision. In 2010, the Danish Transport Authority focused particularly on undertakings' maintenance and their new responsibilities in the field of basic training for train drivers.

Themed supervision is special supervision, in which the Danish Transport Authority wishes to gain a greater insight or wishes to gain an overview of a particular subject across railway undertakings and infrastructure managers. Four themed supervisory operations were carried out in 2010.

Table 2 Number of supervisory operations planned and carried out in 2010

Supervisory operation	Audits			Inspections	Total
	Safety certificates	Safety authorisations	Themed supervision	Inspections	
Laid down in the supervision schedule	17	12	4	0	
Carried out	17	12	4	16	49

Table 2. The number of supervisory operations planned and carried out in 2010 is divided into inspections and audits of safety certificates/safety authorisations, plus themed supervision.

The Danish Transport Authority also carries out a series of inspections on an ongoing basis, building on a concrete assessment of current risks on the railway. This supervision can be initiated on the basis of information, an event or an approach made to the Danish Transport Authority concerning a specific issue, and is therefore not planned supervision.

The Danish Transport Authority used 94 full audit days in real face-to-face time at undertakings, spread across a total of 29 audits carried out in 2010.

The number of working hours used for each individual supervisory operation varies considerably depending on the size of the undertaking and the purpose of the audit.

Chapter 4 presents a description of safety certification and safety authorisation in 2010, and an overview of certificates issued can be found in Annex 5.

Results of supervision

A total of 49 supervisory operations were carried out in 2010 and the Danish Transport Authority issued two bans and two orders. No appeals against decisions in connection with supervision were received in 2010.

Bans and orders were issued in the following two areas:

- Use of rolling stock for tasks where permission had not been granted for the function for which the rolling stock was used.
- Use of fire-fighting equipment where maintenance schedules for the fire-fighting equipment had not been followed.

The Danish Transport Authority identified a number of non-conformities during safety certification and when monitoring undertakings' safety management systems. Non-conformities can involve a discrepancy between the undertakings' safety management systems and the requirements these must satisfy. Non-conformities are also noted where an undertaking fails to follow the frameworks or guidelines laid down by its own safety management system.

The Authority also identified 30 non-conformities in the following three areas:

- Implementation of standards and rules for undertakings' safety activities
- Implementation of individual components of the safety management system, including changes (to system, operation or organisation) and risk assessments
- Management and documentation to ensure that vehicles, technical equipment and plant are maintained in accordance with approved monitoring and maintenance schedules.

In 2010 the Danish Transport Authority focused on undertakings' ability to manage maintenance, so it is natural that this is where most of the non-conformities were found.

The Authority designated the following topics for the four themed supervisory operations in 2010:

1. Compliance with procedures relating to risk assessment, especially in relation to behaviour in the driver's cab
2. Administration of new responsibilities for railway infrastructure managers concerning monitoring, management and maintenance of level crossings
3. Activities to minimise risks in connection with the transport of dangerous goods.
4. Preparedness, compliance with new requirements on the railway sector's preparedness that are being implemented in 2010-11.

The Danish Transport Authority's assessment from its themed supervision was that railway undertakings have functional procedures for behaviour in driver's cabs, concerning, *inter alia*, the use of various media. However, risk assessments in this area are not yet a well-developed part of undertakings' activities.

The Danish Transport Authority considers that Banedanmark's monitoring and maintenance of level crossings followed a systematic, well-documented and well-implemented process. The process has been in place since 2005.

In 2010, the Danish Transport Authority undertook a series of supervisory operations relating to the transport of dangerous goods, with a view to reviewing railway infrastructure managers' activities to minimise risks. The Authority found that there are many goods trains carrying dangerous goods where the wagon lists do not tally with the actual location of the wagons.

Areas of focus for supervision in 2011

The Danish Transport Authority wants to carry out several themed supervisory operations relating to the transport of dangerous goods in 2011. Other areas of focus include preparedness, management assessment and in-service training of train drivers.

Preparedness

In connection with the entry into force of the Executive Order on the preparedness of the railway sector on 1 January 2009, in 2010 the Danish Transport Authority initiated the first supervision of undertakings' ability to meet this requirement. As the Order had an implementation period of one year, this work will continue in 2011.

In-service training of train drivers

In 2010, the Danish Transport Authority focused on the in-service training of train drivers. A need had arisen to look more closely at this topic. The Authority will continue to focus on this area in 2011.

Management assessment

Undertakings' safety reports show that continuous assessment by the management responsible for safety is not functioning as intended. Management assessment must provide input to future action plans. The status of action plans, results of internal audits, updating of risk assessments, analysis of accidents and safety targets, etc. must be assessed at least once a year by the undertaking's senior management¹⁰. The assessment must ensure that the safety management system remains appropriate. The Danish Transport Authority has chosen to focus on this area in 2011.

Supervision of licences

When issuing licences to railway undertakings and infrastructure managers, the Danish Transport Authority must check compliance with a number of basic economic, insurance and legal conditions.

The Authority's supervision of licences is usually based on documents. The undertaking submits documentation showing compliance with the current requirements. Relevant authorities such as the Danish tax authority, municipalities and the National Police Board are consulted, and the submitted documentation is assessed.

The Danish Transport Authority issued one new licence to an infrastructure manager in 2010.

No licences were issued to railway undertakings in 2010.

Three railway undertakings and four infrastructure managers were subject to reassessment in 2010.

The Danish Transport Authority has received insurance documentation from all the railway undertakings and infrastructure managers.

¹⁰ cf. Executive Orders 13 and 14 of 04/01/2007 §§ 24 and 25.

Safety reports from railway undertakings and infrastructure managers

Safety reports for 2010 must be drawn up by all railway infrastructure managers and railway undertakings. Two of the total of 24 reports had not been submitted by the 30 June deadline.

In accordance with current requirements, the reports must address the following four topics: safety targets and action plans, safety indicators, results of internal safety audits and comments on railway safety¹¹.

The general picture is that the safety reports from the undertakings comply with the formal requirements and give an account of activities within the four essential areas. Some reports require further clarification in relation to guidance on safety reports¹².

In general, the quality of the safety reports has improved. There are many good safety reports which reflect the level of safety in undertakings and where the evaluation of action plans is included in the report.

However, some reports still contain no analysis of trends or results of, *inter alia*, internal audits/supervision and evaluation of action plans. The Danish Transport Authority welcomes the fact that undertakings are using the safety reports more actively, e.g. that safety reports are being used as tools in connection with management assessments.

In view of the reports being received, the Danish Transport Authority intends to make safety reports a topic for the supervision of undertakings in 2012.

Safety targets and action plans

Undertakings were generally better at setting feasible qualitative targets. Many undertakings relate more to national safety indicators than to their own risk profile. The Danish Transport Authority would welcome an assessment of whether targets were appropriate and whether action plans have had the desired effect.

A growing number of undertakings are also using qualitative safety targets. There are, for example, targets for working on attitudes, behaviour, information and training. It can be a major advantage to use qualitative targets, to ensure attention continues to be paid to safety work.

The basis for drawing up safety targets must be the undertaking's own risk profile, and targets must have as their starting point the undertaking's activities. Quantitative targets in particular should include areas over which the undertaking itself has a direct influence.

When setting safety targets it is natural to include analysis of the undertaking's development regarding the specified safety indicators. Safety targets may well be so broad that they can be left unchanged for several years, unless the undertaking's risk profile changes.

To ensure that the safety targets are met, undertakings must draw up an action plan for each target. The action plan can establish sub-targets or focus areas that support the undertaking's overall targets, and outline approaches for achieving targets.

¹¹ cf. Executive Order No 13 of 4 January 2007 on the safety authorisation of railway infrastructure managers and Executive Order No 14 of 4 January 2007 on safety certificates for railway undertakings.

¹² Vejledning i udformningen af den årlige sikkerhedsrapport fra jernbanevirksomheder og infrastrukturforvaltere [Guidance on drawing up the annual safety report from railway undertakings and infrastructure managers], March 2010. Available [in Danish] at www.trafikstyrelsen.dk

Safety indicators

There are a total of 45 safety indicators relating to accidents, precursors to accidents, personal injuries and the economic consequences of accidents, etc. All the safety indicators are calculated as absolute figures and are relative to train-km.

The method of calculation allows comparisons to be made with the national average or between undertakings, and to follow the development over time.

Indicators for accidents and personal injuries generally have the highest quality of data. Undertakings' assessments of the consequences of accidents, special costs in the event of damage to property and delays are, however, deficient. The actual costs of accidents are therefore deemed to be greater than shown by the calculations.

Where precursors to accidents and safety irregularities are concerned, there are major variations from one undertaking to another, which indicates that the latest calculation methods have not been fully implemented in all undertakings. A new indicator for the number of audits (supervision) is generally subject to so much uncertainty that it cannot be used.

Results of internal safety audits

The safety report must contain the results of the internal safety audits carried out by the undertaking in the course of the year. "Internal safety audits" covers many different types of supervisory operation, such as inspections, document reviews, audits, etc. – but the inspection of e.g. vehicles is not included. It is therefore very important that the undertaking describes in the safety report what areas and topics in the safety management system and in operation are covered by the internal audits carried out.

The safety reports show that the concept of "internal safety audit (supervision)" is understood in many different ways. There is a tendency for most of an undertaking's supervision to consist of supervision of operations, i.e. inspections, while supervision of the safety management system (audit) is almost forgotten. This means that only very few undertakings are able to explain how their supervision covers the undertakings' safety management system.

In their safety reports, undertakings typically indicated how many supervisory operations were carried out and how many non-conformities were found. The Danish Transport Authority would welcome a description of non-conformities and trends, together with the relevant corrective actions undertaken as a consequence of the undertaking's supervision. In addition, a position should be taken on whether the non-conformities found give cause to modify the undertaking's safety management system.

Results from accident investigations

In 2010 the Accident Investigation Board submitted two accident investigations. The first concerns an accident in 2009, in which a train collided with a lorry on a secure level crossing in Soderup. The accident had serious consequences, and the accident is still being followed up in 2011. The second investigation concerns a collision in the course of shunting in the shunting area at Helgoland in Copenhagen, which occurred in 2007.

Below there is a brief summary of the investigation results¹³, and the initiatives undertaken as a follow-up to the accidents.

¹³ All reports and accounts can be found at www.havarikommissionen.dk

Train collided with lorry on level crossing in Soderup

The level crossing accident occurred on 19 September 2009 in Soderup. A lorry and a train collided at a level crossing protected by a half-barrier system. The train hit the driver's cab of the lorry, trapping a trainee train driver. Following the collision the train derailed, and the lorry was pushed to the side and burst into flames. The accident resulted in two deaths: the trainee in the driver's cab and the driver of the lorry. The train driver was seriously injured, and a train guard and seven passengers sustained minor injuries.

The Accident Investigation Board confirmed that the level crossing was laid out in accordance with current guidelines and that the train was being driven correctly. The accident investigation shows that the lorry stopped too late and therefore drove into the barrier, which had come down. Reduced visibility as a result of fog and the lorry driver's raised blood concentration of THC (cannabis) may also have been significant to the accident.

On the basis of the accident, the Accident Investigation Board recommended that efforts be intensified as regards heavy road users of secured level crossings. Together with the local highways authority, the National Road Directorate, the competent authority in this area, must assess the need for controlling traffic or improving visibility at level crossings.

Collision between two trainsets at Helgoland

On 21 July 2007 two trainsets collided while shunting in the shunting area of the DSB's "Helgoland" workshop. The first shunt sequence had received permission to shunt on the 2nd main track, and the second shunt sequence followed. The driver of the front train then stopped because he believed there was a fault with the train, and the following train did not have time to stop. The driver in the rear cab of the front shunt sequence managed to get out of the cab before there was a front-rear collision. Both trains suffered material damage, but no one was injured.

The conclusion of the investigation was that the rules for shunting were not followed at Helgoland and that there was a lack of local instructions adapted to local conditions. The shunting work was deemed to have been carried out according to routings that entailed a risk of collision.

In 2008, Banedanmark introduced a common shunting instruction setting out precisely the specific rules for shunting at Helgoland. The operator subsequently began work to improve the safety culture among shunting personnel at Helgoland.

A new training organisation was implemented in which an instructor was placed in every department of the undertaking. First and foremost, the instructor at Helgoland wants to work on raising the safety awareness of shunting personnel.

The operator has introduced new procedures for following up precursors to accidents, as well as investigations e.g. when using interview schedules. At the same time, there is a greater focus on collaborating with infrastructure managers and other operators to change lighting and signs at relevant places to prevent misunderstandings.

Chapter 3. Topic: Assessment of safety in technical systems

An assessor undertakes an independent and competent assessment of the risk of changes to the railway system. Railway undertakings and infrastructure managers must increasingly use an assessor when applying for safety authorisation for technical systems.

Use of assessors for risk assessment

For a number of years the Danish Transport Authority has required expert assistance, in the form of assessment, in connection with the safety authorisation of a range of railway vehicles and infrastructure.

In July 2009 and May 2010 executive orders on the authorisation of vehicles and of infrastructure came into force. The orders laid down the Danish practice for authorising railway vehicles and infrastructure, including the requirement for the use of assessment in authorisation matters.

The EU is laying down more and more requirements to harmonise railways in the Community. In July 2010 Regulation (EC) No 352/2009 on the adoption of a common safety method for risk evaluation and assessment came into force (CSM-RA)¹⁴.

The Regulation is directed at undertakings in the railway sector, and lays down requirements for risk assessment in connection with changes in technical systems, and from July 2012 for changes in operations and organisation as well.

The CSM-RA requires that all "significant" changes be assessed. In practice this means that assessment must be used in many more cases than is currently the norm in Denmark.

Assessor's task

An infrastructure manager or railway undertaking renovating or expanding a railway is responsible for carrying out a risk assessment and managing safety for the entire life of the system. The assessor's role is to make an independent assessment of the project's safety.

The assessor must assess the quality of the risk assessment and the result, and also whether the applicant complies with the general principles of risk management at all stages of the project.

¹⁴ Available at <http://www.trafikstyrelsen.dk/DA/Databases/Lovstof.aspx>

The assessor produces a safety assessment report with his opinion. The applicant must follow up on the assessor's recommendations so that any remarks are resolved before an application is made for placing in service.

A safety assessment report will typically include the following

- Description of the assessor's qualifications
- The assessor's activities
- The purpose and scope of the assessment
- Compliance with the requirements of the CSM-RA, discrepancies and recommendations

The conclusion of the independent assessment

The main purpose of the independent assessment is to support the infrastructure manager or railway undertaking in the proper handling of safety. The assessor's safety assessment must be included in the Danish Transport Authority's processing of an application for authorisation.

Ultimately, it is the Danish Transport Authority that must ensure that a new technology can be used in the existing Danish railway system. The Authority is primarily concerned with three factors:

- technical compliance with the existing system
- safe integration so that safety levels are maintained
- compliance with relevant rules and European specifications (TSIs)

The CSM-RA's assessment requirement will gradually replace the existing Danish requirement, and the orders on the authorisation of vehicles and infrastructure will be updated in accordance with the principles of the Regulation in 2011.

Requirements placed on assessors

It is the infrastructure manager or railway undertaking that appoints a relevant assessor. It is recommended that the assessor begin his activities at the start of a change project – especially for more complex projects.

In accordance with the orders on the authorisation of vehicles and infrastructure, the Danish Transport Authority assesses an assessor's competence and mission statement whenever assessment is to be used. This is done on a case-by-case basis, and the assessors are generally external.

According to the CSM-RA, anyone who meets the requirements of the Regulation can work as an assessor of technical, operational and organisational changes. Thus, assessors may be either internal, i.e. from the undertaking being assessed, or external.

The CSM-RA Regulation requires an assessor to be competent and independent.

In this context *competent* means that an assessor has a certain technical understanding within the area(s) to be assessed, as well as a good knowledge of and experience with risk assessment.

Independent means that an assessor is not in any way connected to the project. This means, *inter alia*, that an internal assessor cannot assess an undertaking's project if he is himself involved in the project.

Internal assessment therefore presupposes an organisational structure that guarantees the assessors' independence.

For an external assessor, the requirement of independence means correspondingly that it is not possible, for example, to be both a consultant and an assessor for the same project.

The EU demands that assessors are either approved by the Member States or accredited. Appointment/accreditation takes place "once and for all", and assessors' competence does not therefore have to be assessed anew for each case.

In 2011, the Danish Transport Authority intends to look at possible assessor solutions for the Danish railway sector, and lay down Danish requirements for accreditation/appointment.

Case: Assessment of DSB vehicles

This case gives two examples of new DSB vehicles for which an assessor must be used. The examples describe the roles and the principles applied to prepare the application for authorisation of the two types of vehicle, IC4 and IC2.

Application for authorisation of IC4

Under the new agreement between AnsaldoBreda and DSB in May 2009, DSB took over completion of IC4 in spring 2010, and AnsaldoBreda is now the subcontractor for trainsets in a configuration that largely corresponds to the final type approval obtained by AnsaldoBreda.

Production of trainsets at AnsaldoBreda and the finishing of the trainsets to a specific configuration takes place under AnsaldoBreda's and DSB's quality control and safety management systems. These systems are continually audited by TÜV Nord and DSB.

Before DSB makes changes to an approved configuration, its IC4 programme documents to what extent a given change is safety-related, TSI-relevant and/or complex. The decision as to whether the change is safety-related is risk-assessed in accordance with DSB's own guidelines, but broadly follows the principles of standard EN 50126-1 (Safety Management Concept) and Commission Regulation CSM-RA for risk assessments.

The principles of the procedure used come from the IC4 Programme's safety plan, which has been accepted by the Danish Transport Authority. This contains criteria for how a change should be assessed. DSB's internal assessor (DSB Railway Safety) assesses how the changes should be categorised. Depending on the categorisation, DSB can use either an internal or an external assessor to assess the safety and safety documentation of the change.

Complex changes that could lead to serious injury or changes with TSI relevance must be assessed by an independent third party. Minor and/or simple changes may be handled by an internal assessor. The Danish Transport Authority issues approvals on the basis of DSB's reasoned application and the assessor's assessment/recommendation.

Application for authorisation of IC2

IC2 is a two-wagon variant of IC4, with a driver's cab at each end, and a low-floor carriage. In connection with the type approval of the trainsets, AnsaldoBreda entered into a contract with TÜV Rheinland InterTraffic GmbH (TRIT), which is responsible for a third-party assessment of safety documentation and processes. TRIT works together with the Italian RINA, which is responsible for inspections in Italy. It is expected that the application for type approval will be processed in 2011.

TRIT works according to a detailed mission statement (Scope of Work) that has been accepted by the Danish Transport Authority. The project's safety authorisation is based on the principles set out in EN 50126-1 and the CSM-RA. Annex VII to the Interoperability Directive (57/2008/EC) is also used as a check-list for the parameters to be checked in connection with the approval of the trainsets.

Since IC2 is covered by the Interoperability Directive, verification module D or E (cf. Decision No 768/2008/EC) must be used to verify that the individual trainsets are produced in accordance with the basis for, and the conditions in, the type approval to be issued. Thus, a third-party assessor will also have to be used for this project.

Chapter 4. Technical authorisations and certification

In 2010 the last railway undertakings had their safety management systems certified for the management of railway safety.

Technical authorisations

The areas on which the Danish Transport Authority focuses its efforts include the maintenance of a high degree of safety and while at the same time promoting conditions for the growth of the railways¹⁵.

Within the area of authorisation, the focus was on the following initiatives:

- New frameworks for matters that require official approval
- An holistic view when authorising technical systems

In 2010 the Danish Transport Authority encouraged dialogue with undertakings on new development areas. The aim is to clarify the new frameworks for authorisation. Over a period of several years, new frameworks must be developed for matters that require official approval and matters that undertakings may manage themselves.

The first step was taken in 2010 with an amendment to the Railways Act. In practice this means that certain minor matters may be exempted from official approval. At the same time, undertakings must have a safety management system that covers safety when changes are made to technical systems (see also Annex 2 on how the different parties relate to one another in the railway field).

Furthermore, an "Infrastructure Order" and associated guidelines have been drawn up that define the requirements that applicants have to meet (see Annex 6). Here, risk assessments form the basis of documentation and applications for the placing in service of new systems. The framework will be further clarified by a revision of the Order in 2011.

One of the main challenges is to develop risk assessment methods that are adapted to the railways. The Danish Transport Authority wants to adopt an holistic approach to maintaining safety, while simultaneously supporting the growth of the railways.

In 2010 the Authority drew up guidelines on holistic risk assessment¹⁶. The guidelines review *best practices* compared with the common European methods of risk assessment.

They are concerned with changes in infrastructure and technical safety rules for infrastructure. The principles can now also be used as inspiration when making

¹⁵ Cf. the strategy "Den fælleseuropæiske jernbane – Strategi for høj sikkerhed og smidig gennemførelse i Danmark" [The common European railways – Strategy for high levels of safety and smooth implementation in Denmark], Danish Transport Authority, February 2009.

¹⁶ Vejledning i anvendelse af helhedsorienteret risikovurdering – Ved infrastrukturprojekter og tekniske regler for infrastruktur [Guidelines on the use of holistic risk assessment – For infrastructure projects and technical rules for infrastructure], Danish Transport Authority, 22 December 2010.

changes etc. to vehicles (rolling stock), traffic safety rules and other safety-related matters.

Holistic approach to maintaining safety

A holistic approach to maintaining safety means that safety is considered as a coherent whole, as part of making the railways more efficient. This allows for a relaxation in one area against a tightening up in another, as long as the overall level of safety is maintained.

The holistic view does, however, require undertakings to document by means of risk assessments that all significant risks have been identified and adequately countered.

The first step in the use of holistic risk assessment is the “instinctive knowledge” of those employees who draft the infrastructure projects or technical safety rules for which authorisation is applied for.

The guidelines review the basic principles for a risk assessment. This leads to *best practice* – adapted to the common European rules for risk assessment (CSM-RA for risk assessment¹⁷). Another section of the guidelines specifies, using examples, how the holistic view can be applied in relation to rule changes, waivers and railway infrastructure projects.

Authorisation of infrastructure

Infrastructure that requires the authorisation of the Danish Transport Authority includes bridges and tunnels, track, traction systems, platforms, radio systems, signals, protection systems, remote control systems and train control systems.

The Order on the authorisation of railway infrastructure defines the Danish Transport Authority’s practice for authorising railway infrastructure. In principle, all infrastructure must be approved. However, the Order specifies when it is possible to exempt certain specific cases from the requirement of authorisation.

Infrastructure that has previously received authorisation to be placed in service may not be altered without the infrastructure manager having assessed the significance of the alteration for safety and interoperability.

The undertaking must show that the infrastructure for which authorisation to be placed in service is being requested is suited from a safety perspective, in terms of its construction and area of use, to be used on the railways, including complying with relevant safety rules. It must be demonstrated that the sub-system or product meets the requirements of the EU’s Interoperability Directive and Safety Directive, and that it meets the requirements of applicable Technical Specifications for Interoperability (TSIs).

The Infrastructure Order stipulates that a Notified Body must verify that infrastructure on the TEN network meets all relevant TSI requirements.

For changes to infrastructure, the undertaking must begin by carrying out a provisional risk analysis. This analysis will determine whether the risk associated with changing the system can be controlled.

Changes involving several sub-systems are typically so complicated that an extensive risk assessment is required. A risk assessment is also required when introducing new sub-systems, components or safety rules. The purpose of the assessment is to prioritise the use of risk-reducing initiatives to prevent accidents.

¹⁷ Available at <http://www.trafikstyrelsen.dk/DA/Databases/Lovstof.aspx>

Major authorisations of track and protection systems

In recent years, significant funds have been allocated to the replacement of infrastructure and investment in new railway facilities. In 2010 Banedanmark carried out a large number of replacement missions that required authorisation for placing in service, and over the summer changes on the Sønderborg-Tinglev, Herning-Holstebro and Nordbanen stretches were authorised, for example.

Some of the largest authorisation missions in the area of infrastructure are described in greater detail below.

Metro Cityring

Copenhagen's Metro Cityring will consist of 15.4 km of metro system with 17 stations. It will be served by 28 trains, travelling at up to 90 km/h - a round trip of the entire city ring will take approximately 24 minutes. It is estimated that 275 000 passengers a day will be transported.

In 2010 the Danish Transport Authority participated as an observer in the MSURR group (Metro Sikkerhed Uheld Redning og Rydning – Metro Safety Accident Rescue and Clearance), whose task is to assess and provide advice on systems in connection with safety, accidents, rescue and clearance, incl. situations involving fire.

In 2011 the Authority is to begin processing the long series of authorisations relating to railway safety and structural conditions.

Signal programme

The aim of the signal programme is to replace the existing signal systems throughout the country. Suburban lines will be equipped with Communication Based Train Control (CBTC) technology. The new signal system for long-distance lines will be the common European standard system: European Rail Traffic Management System (ERTMS).

In 2010 Banedanmark, as infrastructure manager, worked on the tenders for five sub-contracts:

- Suburban lines fitted with CBTC track equipment, and a new Traffic Management System/Train Control Centre (TMS/TCC) to be established in Copenhagen. All suburban trains equipped with CBTC driver's cab equipment
- Long-distance vehicles equipped with ETCS driver's cab equipment
- Long-distance infrastructure equipped with ERTMS track equipment and a new TMS/TCC in Copenhagen for the east region, and corresponding TMS/TCC for the west region in Fredericia
- Operating and traffic management rules based on CBTC/ERTMS for both railway infrastructure managers and railway undertakings
- Necessary training and anchoring in the organisations of the railway infrastructure managers and railway undertakings affected

Supplier contracts for suburban and long-distance lines will be awarded in 2011.

The Danish Transport Authority has adapted the organisation of its work so that it mirrors Banedanmark's organisation, with one parent programme level and five underlying sub-projects.

Cooperation between the Danish Transport Authority and Banedanmark's signal programme was initiated in earnest in 2010, with the defining of a process plan for official approval, the development of safety plans, and the setting of safety targets for the entire signal programme and for the sub-projects.

In 2011 it is crucial that closer cooperative relations be established with the winning signal system supplier and its Safety Assessor. The Danish Transport Authority also

wants to establish a joint venture with the railway safety authorities in neighbouring Sweden and Germany.

STM

An STM (Specific Transmission Module) is an interim solution in moving from the national train control systems to the common European ERTMS system. An STM makes it possible for a vehicle also fitted with ERTMS to "read" signals from the fixed part of the national train control system (ATC) and to display the signals on the ERTMS driver machine interface (DMI).

In 2010 the main work involved establishing a joint venture between Denmark and Sweden to safeguard traffic over the Øresund bridge when ERTMS is established in Sweden and Denmark. The actual approval work on a Danish STM based on ERTMS version 2.3.0.d is expected to begin in 2011.

GSM-R

GSM-R is a Europe-wide train radio system, consisting of a mobile and a fixed part, which is again divided into GSM-R voice and GSM-R data. GSM-R voice will be introduced in Denmark between 2011 and 2014 on Banedanmark's network.

GSM-R data is part of Banedanmark's signal programme, in that it is used for data communication between infrastructure and train. This part will be introduced between 2013 and 2019.

The project is divided into an infrastructure project, which is in the hands of Banedanmark, and a rolling stock project, which will be a matter for DSB. The actual approval work is expected to begin in 2011.

New protection system on Storebælt takes shape.

The Storebælt link was equipped from the beginning with a fully electronic protection system at each of the three stations of Korsør, Sprogø and Nyborg. Over time, an increased need has emerged for an upgrade, in part because it has been difficult from a technical and maintenance perspective to obtain the necessary components.

The three protection systems are now being replaced by the latest generation of fully electronic protection systems, type EBILock 950 R4. This new protection system, which manages the three stations, is located in Korsør, as is the manoeuvring system, which is being replaced with type EbiScreen 2000.

The project has been assessed by an assessor as it is a new construction. This helped establish a well-documented and, from a safety point of view, solid basis for the approval process. The system is expected to be placed in service in 2011.

New types of level crossing

Since 2007 Banedanmark has been trialling a new type of ballast-free level-crossing surface. The surface consists of concrete slabs with grooves into which the rails are cast with a special rubber mass known as "Corkelast". The system can also be used for tram rails and on bridges. The system name for the new level-crossing surface is "e)(stelfundo".

The advantage of this system is that it avoids the usual problems with rail corrosion and rail fastenings in level crossings, which means fewer maintenance costs and a significantly longer life. At the same time, the system gives a better track insulation ability, thereby avoiding problems in the protection systems. The system is already in use in a number of countries, including the Netherlands, Germany, Sweden and Austria. Type approval will be completed in 2011.

New types of points mechanism

In recent years Banedanmark has tested new types of points mechanism with a view to finding a successor to the well-known 94-mechanism in particular.

After a trial period, four new types of points mechanism were granted permission to be placed in service indefinitely. Since a new siding was being built at Ringsted, Banedanmark was given permission to construct two 1:26.5 points using Alstom MET mechanisms for the purposes of gaining experience.

Mutual recognition from other countries was used, including official approvals from Germany. When applying for permission to place in use, Banedanmark presented a safety plan, a risk workshop and a safety case. The project underwent internal assessment, and external assessment for certain sub-elements.

Approval of safety rules

'Safety rules' are the railway infrastructure managers' and railway undertakings' technical and traffic-related safety rules for infrastructure, rolling stock, training and traffic safety. It is the responsibility of the individual railway infrastructure manager or railway undertaking to obtain approval for the rules needed to maintain safety.

Among other things, an application for approval of new or revised rules with safety-related content must contain a description of the amendment or addition being made and an assessment of the significance of this in terms of safety.

The Danish Transport Authority assesses whether the applicant has documented that the level of safety in the undertaking's new or revised rules conforms to the legislation, and whether these rules may have a bearing on other rules, standards or regulations.

The majority of cases in 2010 involved various waivers in connection with renewal projects on the railways.

The number of cases of approvals of technical safety rules was up in 2010 compared with 2009, but the number remains relatively modest. One particular example of rule approval cases within the technical sphere in 2010 concerned changes to Banedanmark's rules for transverse profiles and track position checks to bring them into line with the European rules (TSI Infrastructure).

The largest single case in the field of traffic-related safety rules in 2010 was the fire in the protection system at Holbæk on the night of 4 and 5 July 2010. During the subsequent repairs the old type of components for the protection system could no longer be supplied, and therefore the system was replaced.

The reconstruction of a new system led to a series of applications for waivers of Sikringsanlæggene Og Deres Betjening [Protection Systems and their Use] (SODB) Construction Provisions and the approval of various safety circulars (traffic regulations for driving in the area). The new protection system is expected to be placed in service in 2012.

Other major approvals of traffic-related safety rules include that of a series of Banedanmark instructions in special inspection notices (SINs), with an attempt being made to incorporate the local shunting instructions in SINs.

Finally, approval was granted to a series of construction provisions for major work on the Banedanmark infrastructure.

Approval of rolling stock

Authorisation to place in service is the Danish Transport Authority's approval of the technical characteristics and conditions of use of a vehicle. It is these characteristics that are relevant to railway safety and interoperability on Europe's railways.

The Authority has drafted an order on the approval of rolling stock, a small guide and detailed guidelines. These can help applicants through the different stages and phases of drafting a complete set of application documents.

Undertakings that apply for authorisation to place vehicles in service must submit an application to the Danish Transport Authority, including, *inter alia*, a risk assessment and a safety plan. The Authority may require an undertaking to make use of expert assistance, including the assistance of an assessor, when applying for approval.

If the vehicle is covered by the European technical specifications for interoperability (TSI rules), the applicant must submit an EC declaration of verification, attested by a Notified Body, to the Danish Transport Authority. The declaration documents the fact that the vehicle meets the requirements of the Interoperability Directive and the relevant TSIs – and therefore fits into the context of the European rail network.

In 2010, as a result of European legislation, the Danish Transport Authority established a vehicle register. In future, vehicles covered by the Interoperability Directive must be registered in the national vehicle register in order to be used.

Also in 2010, the Authority registered all existing vehicles that have been approved for use on the Danish rail network and in this connection issued European vehicle numbers to those vehicles that did not already have one.

Authorisations in 2010

In 2010, approximately 200 authorisations were issued for the placing of rolling stock in service. Some authorisations covered more than one vehicle. Around one third of the authorisations were issued for traction units, locomotives and trains. The rest were for special vehicles and wagons.

In addition, the Danish Transport Authority issued a smaller number of authorisations for safety rules as well as test operations and special transports.

Annex 5 provides an overview of authorisations of rolling stock in 2010. Four of the slightly bigger cases are described below.

LINT 41

In 2010 Arriva A/S applied for authorisation to place 12 new Coradia LINT 41 trains in service. The LINT 41, which is constructed on the ALSTOM Coradia platform, is a well-known train in Denmark. Nevertheless, Arriva's LINT 41 is a new variant of the type with, *inter alia*, a different bogie design.

Prior to authorisation to place in service, the manufacturer of the trains had applied to the Danish Transport Authority for type approval. In connection with the type approval, the German EBC was the Notified Body for verifying that the train had been designed in accordance with the technical specifications for noise (TSI-NOI). The applicant was notified of type approval and authorisation to place in service in November 2010.

IC2 litra MP

The IC2 litra MP is a 2-wagon variant of IC4. The train is constructed for a maximum speed of 180 km/h, and has an "intercity" interior corresponding to IC4.

In 2010, six project meetings were held between the manufacturer AnsaldoBreda, DSB and the Danish Transport Authority. The authorisation process for type approval was described and agreed in an official approval plan. In accordance with this plan, AnsaldoBreda involved an independent third-party assessor, TÜV Rheinland. (see also Chapter 3)

Desiro

In 2010 the Danish Transport Authority granted type approval for a variant of the Desiro Classic, produced by Siemens AG. Against this background, DSB applied for and received authorisation to place a total of eight trains in service. They are now in service on the Grenåbane.

The trains are fitted with a more environmentally friendly engine compared to the Desiro train used by DSB on the Svendborgbane. They are fitted, *inter alia*, with a particle filter.

IC4

In the spring of 2010 DSB took over manufacture of IC4 trains from AnsaldoBreda. At the time the producer had received type approval for single-unit and coupled operation, and DSB had 14 single-unit first-generation trains in passenger operation.

In the course of 2010, DSB received type approval and four authorisations to place in service second-generation trains for passenger operation involving two coupled trains (see Chapter 3 for more on the authorisation process).

The Danish Transport Authority also issued licences for operation with three coupled trains.

New certificates and safety authorisations

In 2010 the last of the existing undertakings had their safety management systems certified. This means that at the end of 2010 there were 12 railway undertakings with certificate A + B and three with certificate B in Denmark. There were also nine safety-approved infrastructure managers

During its follow-up supervision of the undertakings, the Danish Transport Authority was able to establish that undertakings that have now had a safety management system for some years are using this actively and have become aware of many of the benefits of working with these systems. Annex 4 provides an overview of certifications and authorisations in 2010.

Safety certification

A safety certificate comprises a part A and a part B. Together, the two parts of the certificate cover the undertaking's safety-related activities as described in the Executive Order.

Part A of the safety certificate sets general requirements for the undertaking, including developing a safety management system. The railway undertaking must have a safety certificate part A in the country where it has its main operations. This is valid throughout the EU for a maximum of five years.

Part B focuses on the specific infrastructure that the railway undertaking uses. The railway undertaking must have been issued with a safety certificate part B for each country in which it wishes to carry out railway transport.

Safety certificate part A

In 2010 the Danish Transport Authority issued four new safety certificates to railway undertakings.

The Authority is not aware of any railway undertakings with a safety certificate part A from Denmark that have applied for a safety certificate part B in another EU Member State.

Safety certificate part B

In order to be issued with part B, checks are required to ensure that the railway undertaking's safety management system covers national requirements and conditions relating to the infrastructure intended to be used. A check is carried out on conformity between part A of the safety certificate and the new application for part B.

All railway undertakings with a safety certificate part A in Denmark simultaneously receive a safety certificate part B to operate in Denmark. The requirements for both safety certificates are thus dealt with in one and the same process.

For railway undertakings with a safety certificate part A from another EU Member State, an application for a safety certificate part B is dealt with as a separate process. Safety certificates part B have been issued in Denmark to three railway undertakings with safety certificates part A issued in another EU country. In all three cases the undertakings are from Sweden.

The Danish Transport Authority attaches importance to the undertaking ensuring coherence between the solutions the undertaking has described in part A and the solutions it has chosen to fulfil the requirements for part B. This can lead to the Authority asking about parts of the safety management system that have already been approved by a national authority in another EU country.

During 2010, the Danish Transport Authority issued one new safety certificate part B and amended one B certificate. The amendment to the safety certificate was because the undertaking wanted to expand operations on a new section of railway.

Safety authorisation

Safety authorisation requires the infrastructure manager to have developed a safety management system and to be able to document that it is able to control risks on the railway network. The infrastructure manager must also undertake a coordinating role with respect to the railway undertakings that operate on its sections of track.

During 2010, the Danish Transport Authority issued three safety authorisations to infrastructure managers.

The Authority also amended one safety authorisation in 2010. After a merger, the infrastructure manager's safety authorisation was to be extended to include an extra line. This required amendment of the safety authorisation.

Authorisation to operate railways

When issuing licences to railway undertakings and infrastructure managers, the Danish Transport Authority must check compliance with a number of basic economic, insurance and legal conditions.

The Danish Transport Authority's supervision of licences is usually based on documents. The undertaking submits documentation showing compliance with the current requirements. Relevant authorities such as the Danish tax authority, municipalities and the National Police Board are consulted, and the submitted documentation is assessed.

The Danish Transport Authority issued one new licence to an infrastructure manager in 2010.

No licences were issued to railway undertakings in 2010.

There were three reassessments of railway undertakings and four reassessments of infrastructure managers in 2010.

The Danish Transport Authority has received insurance documentation from all the railway undertakings and infrastructure managers.

Personal certification

The Danish Transport Authority approves training programmes for persons who carry out safety-classified functions on the railway. The Authority also issues licences to train drivers.

At the end of 2010 there were 3 209 persons with a valid train driver's licence registered with the Danish Transport Authority. Of these, 161 licences had been issued in 2010. The number of valid licences has increased by 7% compared with 2009, while the number of active train drivers is stable. There were three appeals in connection with non-conformities relating to the revocation of licences.

In accordance with the Train Driver's Directive, the Danish Transport Authority keeps a register of approved instructors and examiners for train drivers, and began publishing this on its website in 2010.

The Danish Transport Authority has continued its collaboration on public-sector train-driver training with the Ministry of Education, the railway sector, the examiners on the programme and the two colleges responsible for the theoretical part of the train-driver programme. In collaboration with the Ministry of Education, schools and the sector (represented by the Danish Transport Training Board (TUR)), public-sector train driver training has been revised and restructured, so that training and examinations focus on licensing and certificate competences.

Medical certificates

The Danish Transport Authority issues medical certificates to persons who carry out safety-classified functions. A total of 3 902 medical certificates were issued in 2010.¹⁸ Two complaints were made concerning decisions on medical certificates taken by the Authority in 2010.

The Authority continued its practice of recognising Swedish medical certificates issued for all types of safety-classified function. In addition, the Authority is continuing its practice of recognising German medical certificates for train drivers and employees in the undertakings not covered by the current agreements on mutual recognition.

¹⁸ In 2009 the Danish Transport Authority issued 3 780 medical certificates.

Chapter 5. Important amendments to legislation and regulations

Major focus in 2010 on regulating railway infrastructure and on implementing instruments deriving from the EU's Safety Directive. The Danish Transport Authority continues to focus on having an impact in international forums for the development of railways throughout Europe.

Regulation of the sector

In 2010, the Ministry of Transport introduced two bills to amend the *Railways Act*. The amendments affected a variety of areas. For example, Banedanmark's Board was abolished and a Railways Board (Regulatory Body) set up. The new Board has been given responsibility for monitoring the market in the railways sector.

Two amendments had a considerable impact on the Danish Transport Authority's role as a railways authority. The change in the law has opened up the possibility for the Authority to define rules for the operation of railways on historic lines. Thus, in 2010, the Authority issued the "historic lines package", which is described below.

One amendment of the *Railways Act* also made it possible for the Danish Transport Authority to draft rules on exemptions for certain matters from safety approval. The Railways Act did not specifically set a lower limit for what requires approval. The Danish Transport Authority has therefore taken an important next step in its work to specify which matters require official approval and what undertakings may manage themselves. This work will be continued in 2011.

International work

In 2010 the Danish Transport Authority's international work in the field of safety unfolded within three main areas.

Taking decisions in RISC

2010 was a productive year for the EU Commission's Working Group, Railway Interoperability and Safety Committee (RISC). Seventeen new legislative instruments were adopted, and the Danish Transport Authority left its mark on several decisions and discussions. Among other things, the Authority was given the opportunity to move the very important TSI LOC & PASS (Locomotives and Passenger Wagons), together with the common safety method for assessing conformity with the requirements for obtaining railway safety certificates and safety approvals (auditing) in Denmark's preferred direction.

Participation in the European Railway Agency's working groups

In 2010 the Danish Transport Authority participated in almost 25 working groups – mainly within the European Railway Agency. In particular, the Authority gave considerable attention to the work on revising the Command and Signalling TSI (TSI-CCS), which forms the basis of the deployment of ERTMS.

On several occasions the Danish Transport Authority found the European Railway Agency's quality control to be inadequate. Denmark, together with other Member States, therefore drew attention to its dissatisfaction with the RISC's handling of TSI-CCS. The objections led to the Commission choosing to postpone the final discussions in the committee on a number of occasions.

Cross acceptance

Denmark participated actively in ERA's Cross Acceptance Unit. The aim of the Cross-acceptance working group is to create the right basis for simplifying the placing in service of vehicles between Member States. The next step is to have national rules classified alongside those of Denmark's neighbours, something which is taking place in a separate forum (GIG Nord).

The Danish Transport Authority participated proactively in GIG Nord in close collaboration with Germany, Norway, Sweden and Finland. Here it worked intensively to have national rules for vehicles classified alongside the rules of neighbouring countries, so that in future rules will not be double-checked when a train is deployed in another country.

Chair of the Corridor B Executive Board

It has been decided at European level that the common European train control and communication system, ERTMS, is to form the technical basis for increasing the EU's goods transport and safety. ERTMS must therefore be rolled out in six "corridors", one of which (Corridor B) runs from Stockholm to Naples via the Femern Bælt link. In March 2010 Denmark was elected chair of the executive board for Corridor B. The Danish Transport Authority performs this task.

To take charge of the practical deployment of ERTMS in the corridor, a management committee was set up consisting of the countries' infrastructure managers. In June 2010 Austria was elected to chair this committee.

2010 was used by the executive board and the management committee to begin the work that in 2011 must result in an implementation plan that has to function as a schedule for the work. The deadline for implementing ERTMS on Corridor B is 2020.

New and amended regulations

The Danish Transport Authority issued a series of executive orders and railway safety regulations (BJs) in 2010. See overview in Annex 7.

Provisions on operation on railway infrastructure with train control

One of the aims of the executive order is to simplify the paper path for undertakings, including for historic lines, so that in future they will only have to apply to one place when applying for operation without mobile train control systems on infrastructure with fixed train control.

Previously, railway undertakings had to ask the Danish Transport Authority for dispensation from the requirement for mobile train control systems. The BJ stipulates that in future it will be the railway infrastructure manager that lays down detailed requirements on operating trains without mobile train control systems on lines with fixed train control systems.

There were no changes to the rule that operation without mobile train control systems is only allowed up to 70 km/h. The rules also apply to historic trains.

Executive Order on the approval of railway infrastructure

Based on new EU rules and current practice, the Executive Order defines the approval process for railway infrastructure. Various processes are defined depending on whether *changes* to infrastructure (renewal or upgrade) or the approval of *new* infrastructure are concerned.

The Executive Order also contains rules for the issuing of authorisations for placing in service and type approvals. Finally, it defines what is required in order to apply for a simplified process.

Executive Order on non-commercial railway operation etc.

The Danish Transport Authority has issued a "historic lines package" consisting of the Historic Lines Executive Order and three amending orders. The purpose of the package

is to bring together all the requirements on historic lines and historic vehicles and increase transparency in this area.

With the historic lines package, historic vehicles and lines are simultaneously exempt from the increasing number of EU requirements on railways.

The Historic Lines Executive Order brings together previous practice in the area and lays down conditions for running a non-commercial railway operation.

Order amending Executive Order on liability insurance for railway undertakings and railway infrastructure managers

The amendment concerns a linguistic clarification in relation to historic lines.

Executive Order on liability for safety measures at level crossings on Banedanmark's network that are open to general traffic.

The Order governs Banedanmark's liability as infrastructure manager and the Danish Transport Authority's liability as authority for road-related safety measures.

Executive Order on European critical infrastructure in the railway sphere (EPCIP Directive)

The Order implements the EPCIP Directive regarding the designation of European critical infrastructure in the railway sphere.

The main purpose of the Directive is to protect critical infrastructure against terrorist threats, man-made technological threats and natural disasters.

This is a framework directive which will introduce procedures for isolating and designating European critical infrastructure as well as a common approach to assessing the need to improve the protection of such infrastructure.

Executive Order on breath tests in accordance with the Railways Act

In situations where a railway undertaking or infrastructure manager suspects that a safety-certified person, e.g. a locomotive driver, train guard or traffic manager has an alcohol concentration in his or her blood of 0.20 per mil or more, the railway undertaking or infrastructure manager must notify the police, so that the police can carry out a breath test on the person concerned.

The Order contains provisions describing the more specific circumstances that must be in place if the police carry out a breath test.

Executive Order on Danish Transport Authority fees

The Danish Transport Authority has altered the principle behind its calculation of fees such that its actual expenses in connection with processing cases will in future be covered.

The Order has introduced a "supplementary bill" principle, with a ceiling for the issue and renewal of safety certificates and authorisations.

Executive Order on regulation

An order is issued each year regulating the compensation and insurance amounts that railway undertakings and infrastructure managers must pay or cover as a minimum within the next insurance year (1 January – 31 December).

The minimum insurance amount for 2010 for personal injury or loss of main provider and property damage is DKK 364 million. A lower minimum amount applies to railway undertakings that operate non-commercial railways (historic lines).

The Safety Directive and secondary legislation

In 2010 an amending order and a new order implementing the Safety Directive in Danish law were issued.

Executive Order amending the order implementing the Railway Safety Directive

Annex 1 of the Railway Safety Directive 2004/49/EC lays down the Common Safety Indicators (CSI). The Order implements the revised Annex 1 of the Railway Safety Directive in Danish law¹⁹.

The Common Safety Indicators are statistical indicators that must be used to assess whether the Common Safety Targets (CST) have been achieved and to monitor the development of railway safety in the Member States on the basis of the Member States' annual safety reports.

The Common Safety Indicators are divided into seven different sets of Common Safety Indicators. These are accidents, dangerous goods, suicide, precursors to accidents, indicators to be used to calculate the socio-economic cost of accidents, indicators relating to the infrastructure's technical safety and its implementation and indicators relating to safety management.

The Reporting Executive Order

The new Reporting Executive Order results from the revision of Annex 1 of the Safety Directive and also a desire to reduce the undertakings' administrative burden. The undertakings are therefore only obliged to report consequences in connection with significant accidents or accidents with minor personal injuries. The number of details of consequences of accidents is also reduced. In addition, undertakings are no longer obliged to report details of the undertaking's recommendations as a result of accidents or incidents (precursors to accidents).

The purpose of the undertakings' reports is to establish a statistical basis that can contribute towards a continuous assessment of efforts made to ensure safe railways. The division of responsibilities for ensuring safety on the railways has not changed.

Executive Order implementing the Safety Directive

This Order changes the scope of the Safety Directive in Denmark in such a way that, for example, privately owned railway infrastructure that is only used for the owner's own goods operations, and historic lines, are exempt from the Safety Directive.

The most important amendment to the Safety Directive concerns responsibility for ensuring the vehicles are properly maintained. For all vehicles, a position must be taken on who is responsible for this. The entity concerned is known as the *Entity in Charge of Maintenance* (ECM). The ECM must be registered in the NVR, the national vehicle register.

The Commission has provided the following legislative instruments relating to the Safety Directive, which apply directly in Danish law:

Decision on Common Safety Targets²⁰

The decision defines the first set of safety targets (CST) for each individual Member State.²¹

Regulations 1158/2010²² and 1169/2010²³ on a common method of assessing conformity (safety certificates and safety authorisations)

¹⁹ Annex 1 of the Railway Safety Directive was revised by Directive 2009/149/EC.

²⁰ Commission Decision No 4889 of 19 June 2010 on Common Safety Targets.

²¹ The value for the total/collective safety targets and the individual safety targets for each of the five groups of persons; passengers, employees, level-crossing users, other persons and persons on railway property without permission

²² Commission Regulation (EU) No 1158/2010 of 9 December 2010 on a common safety method for assessing conformity with the requirements for obtaining railway safety certificates.

The regulations contain common methods for the assessment by national authorities of compliance with the requirements for safety management systems in connection with the issuing of certificates to railway undertakings and safety authorisations to railway infrastructure managers. They also provide broad guidelines for the authorities' activities in connection with the issuing and follow-up of certificates and authorisations.

The Interoperability Directive and secondary legislation

In 2010 the Danish Transport Agency issued a new executive order implementing the Interoperability Directive in Danish law, together with an amending order.

Executive Order on interoperability in the railway system

The Order implements the Interoperability Directive (2008/57/EC), together with amendments to this Directive (Directive 2009/131/EC and Commission Decision 2009/965/EC).

The main purpose of Directive 2008/57/EC is to make rail transport more competitive in relation to other forms of transport and break down the barriers preventing train traffic from freely crossing national borders in the EU.

The Order was subsequently amended to exempt historic rail infrastructure and historic vehicles from the scope of the Interoperability Directive.

Executive Order on the registration of railway vehicles

The Order lays down the requirements for vehicles to be included in a vehicle register (NVR), as specified in the Interoperability Directive (2008/57/EC).

The Order was subsequently amended to exempt from the registration requirement vehicles on privately owned railway infrastructure, historic rail infrastructure, and track that is barred to public traffic in connection with maintenance.

Technical Specifications for Interoperability (TSI)

The Commission has not issued any new TSIs in addition to those already implemented in Denmark. A natural consequence of this is that the Danish Transport Agency did not implement any new TSIs in 2010.

The Danish Transport Agency has, however, amended the TSI CCS for train control and signals (conventional trains and high-speed trains)²⁴.

It follows from the preamble to the Commission Decision that some of the technical documents referred to in Annex A of Decisions 2006/679/EC and 2006/860/EC may be adapted to technical developments, of which ERTMS and ERTMS components are part. The Commission Decision means that "the list of mandatory specifications" and "the list of informative specifications" in Annex A of the aforementioned Commission decisions were *replaced* by the Commission Decision of 19 October 2009.

The amendment was implemented through the BJ implementing technical specifications for interoperability (TSI) for sub-systems in trans-European conventional and high speed rail systems.

²³ Commission Regulation (EU) No 1169/2919 of 10 December 2010 on a common safety method for assessing conformity with the requirements for obtaining railway safety authorisations.

²⁴ Commission Decision of 19 October 2009 amending Decisions 2006/679/EC and 2006/860/EC as regards technical specifications for interoperability relating to sub-systems of the trans-European conventional and high-speed rail systems

Provisions implementing technical specifications for interoperability (TSI) for sub-systems in trans-European conventional and high-speed rail systems

The BJ is a merger of applicable “old provisions”, i.e. previously implemented Commission decisions concerning TSI train control and signals, as well as amendments to the TSI’s Annex A. The BJ also implements a new Commission decision (see above).

The amendments have been brought together in this way so that in future, parties working to implement ERTMS in Denmark can find all the applicable technical requirements in one place.

Annex 1: The railways in figures

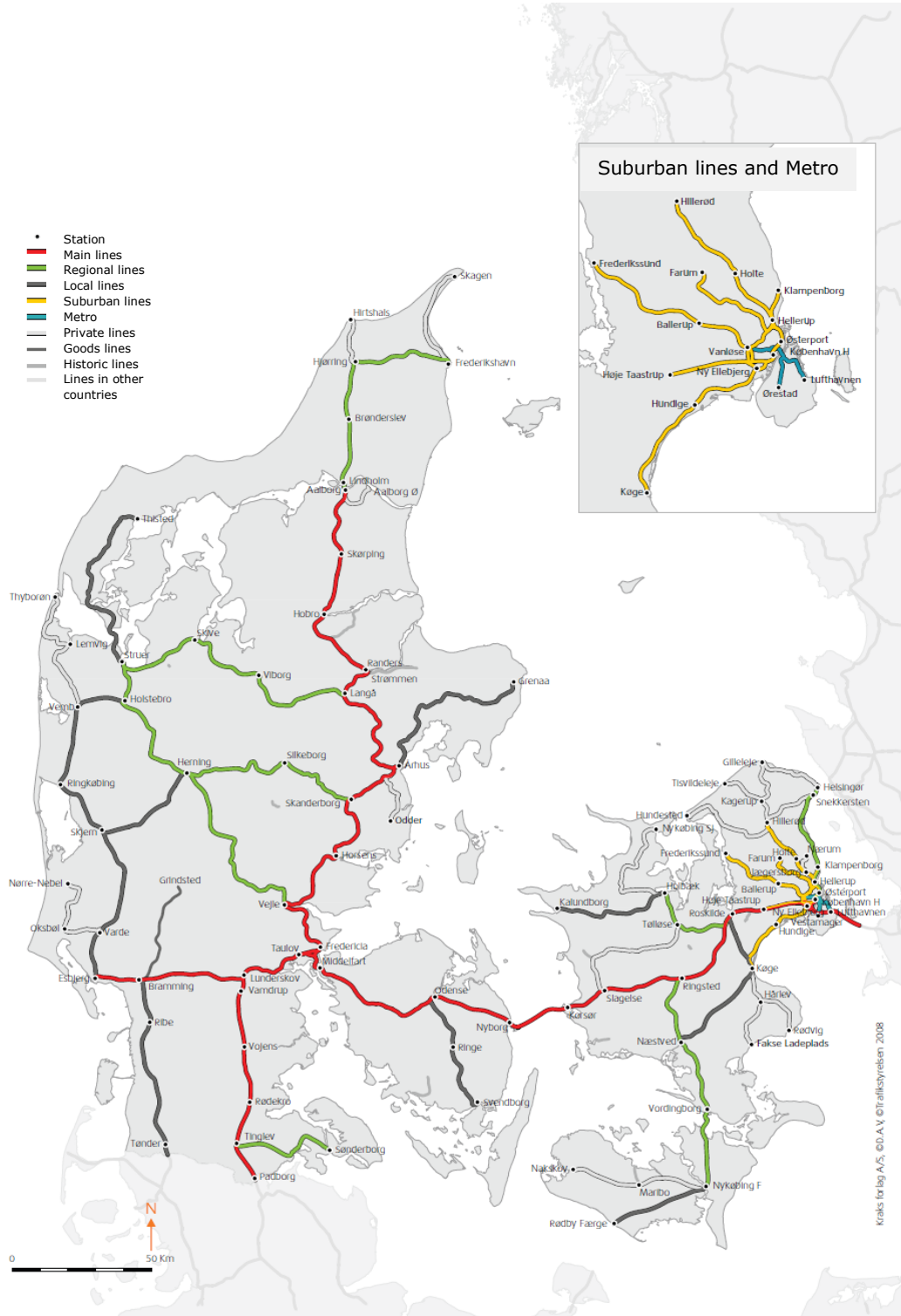


Figure 13. Map of the various classes of line and their distribution in Denmark.

Table 3. Information on railway infrastructure

Railway infrastructure	2009	2010
Number of infrastructure managers	11	9
Total length of lines	2741	2702
Total length of track	3613	4094
Length of electrified lines	705	687
Km of lines with ATC, ATC train stopping/ACT equipment	1469	1447
Total number of level crossings	1364	1470
-automatic level crossings with half or full barriers	-	538
-automatic barrier systems and track-side protection	-	169
-manually operated barrier systems	-	36
-level crossings with warning signal systems	-	190
-manually operated automatic warning signal systems	-	1
-level crossings without automatic protection	604	536

Table 3. Figures from railway infrastructure managers. A new calculation method for level crossings was introduced for 2010, and the corresponding data are not available for 2009.

Table 4. Information on railway undertakings

Railway undertaking	2009	2010
Number of railway undertakings	15	16
Number of locomotives	173	169
Number of trainsets (passenger transport)	634	681
Number of train drivers	3249	2676
Volume of passenger transport (million passenger-km)*	6389	6389
Volume of freight transport (million tonne-km)	3,25*	3,98
Total number of kilometres travelled (million train-km)*	82,15	82,15

Table 4. Figures from railway undertakings. *Figures from Statistics Denmark - data for 2010 have not yet been published.

Annex 2: Relations between different parties involved in the railways

The Danish Transport Authority is an authority which falls under the auspices of the Ministry of Transport. With two mergers between different authorities in 2010, it now has responsibilities and tasks covering railways, roads and aviation.

The Authority deals with a wide range of tasks in the fields of railways, ferries and other public transport, as well as within road transport, automotive technology and in connection with postal legislation. The Authority has nearly 400 employees.

As a railway authority, it is the Danish Transport Authority's task to take care of the rules for safety and interoperability. The Ministry of Transport drafts the general bills.

At the same time, it is the Authority's role to safety-approve infrastructure managers and certify railway undertakings. Employees and technical systems, safety rules, etc. must also be approved by the Authority if related to safety or covered by rules on interoperability.

Railway undertakings and infrastructure managers are responsible for safety. They manage day-to-day operation, as well as the development and maintenance of technical systems.

The Accident Investigation Board is the investigating authority in the event of an accident. It carries out independent investigations and makes recommendations to prevent accidents.

Figure 14. Parties involved in railway safety

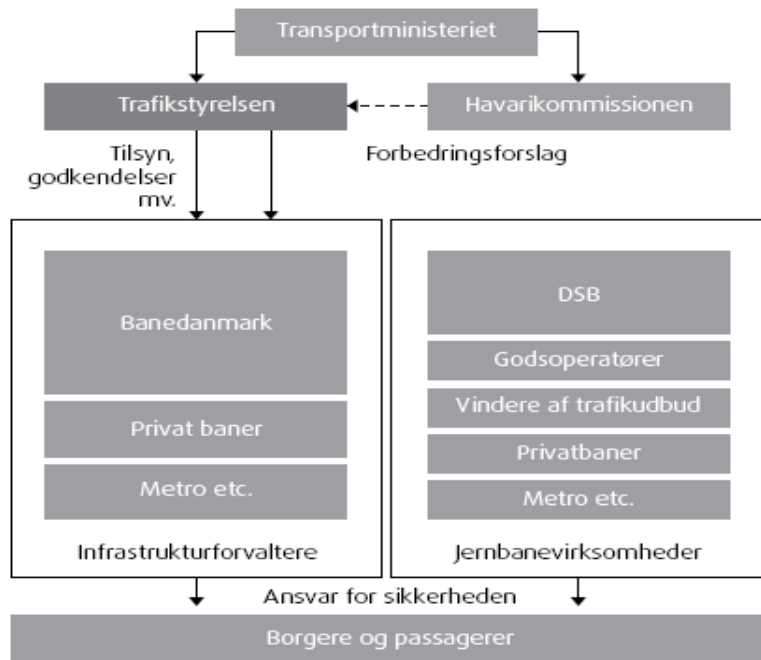
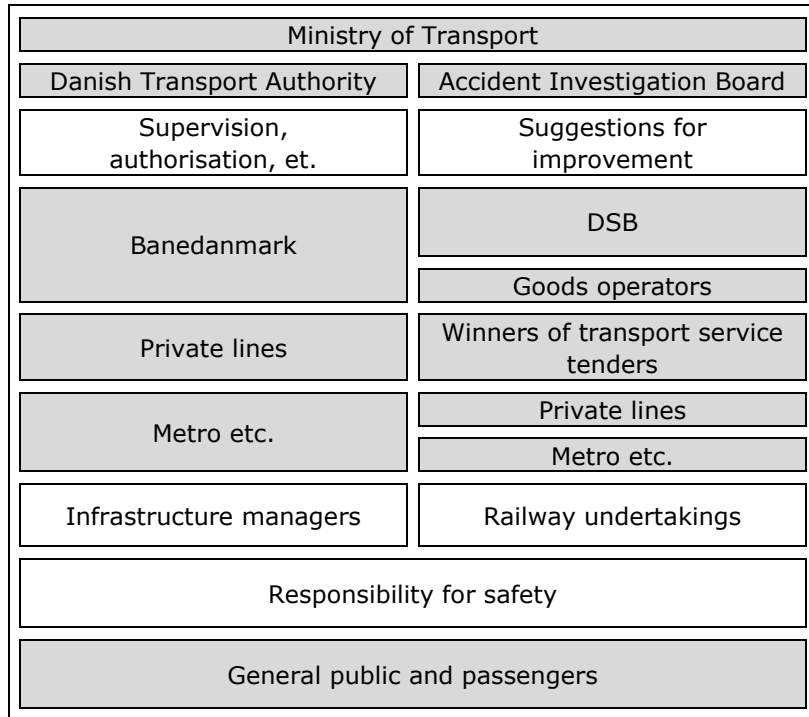


Figure 14. The principal players in the railway sector today. Railway undertakings and railway infrastructure managers are each separately responsible for safety, operation etc. in relation to passengers and the public. The Danish Transport Authority deals with authorisations and carries out supervision to check that these players fulfil their responsibilities responsibly. The Ministry of Transport owns Banedanmark and DSB.

Figure 14



Annex 3: Definitions used

Accidents

– *Train collision* is understood to mean a train collision, including a collision with obstacles within the structural gauge limits (collision), a head-on collision between two trains or a collision between the front and rear of two trains or a sideways collision between part of one train and part of another train, or a train in collision with shunting rolling stock or objects that are fixed in place or are temporarily on or near the track, except at level crossings, if the objects have been lost by crossing vehicles or persons.

– *Derailment* is understood to mean any incident in which at least one of the train's wheels comes off the rails.

– *Accidents at level crossings* is understood to mean accidents at level crossings involving at least one railway vehicle and one or more crossing vehicles, other crossing users, e.g. pedestrians, or objects temporarily on or near the track if these have been lost by crossing vehicles or users.

– *Personal injury caused by moving rolling stock* is understood to mean injury to one or more persons who are either hit by a railway vehicle or by an object attached to or which has been dislodged from the vehicle. The definition also covers persons who fall out of railway vehicles, and persons who fall or are hit by loose objects while travelling in railway vehicles.

– *Fire in rolling stock* is understood to mean fires and explosions, including of loads, under way between a departure station and a destination, including while stopped at the departure station, the destination or while stopped on the way and while shunting.

– *Other types of accident* is understood to mean all accidents other than train collisions, derailments, accidents at level crossings, personal injury caused by moving rolling stock and fire in rolling stock.

Significant accidents

– *Extensive destruction of rolling stock, track or other plant or the environment* is understood to mean destruction valued at at least DKK 1.2 million.

– *Extensive disruption to traffic* is understood to mean that train traffic is at a standstill for six hours or more on a main line.

Suicide

– *Suicide* is understood to mean an action by which a person intentionally takes his own life, and which is recorded as such by the competent authorities.

Dangerous goods

– *Dangerous goods* is understood to mean substances and objects that may not be transported under the Regulation concerning the International Carriage of Dangerous Goods by Rail (RID), or may only be transposed under conditions defined in the RID.

– *Accidents in connection with the transport of dangerous goods* is understood to mean any accident or incident that must be reported in accordance with Chapter 1.8.5 of the

RID or the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

Precursors to accidents

- *Broken rails* is understood to mean any rail that has broken into two or more pieces, or any rail from which a piece of metal has broken away, leaving a hole more than 50 mm long and more than 10 mm deep on the running surface.
- *Track buckles* is understood to mean a fault in the continuum or geometry of the track which for safety reasons requires the immediate closure of the track or a reduction of the permissible speed.
- *Signal failure* is understood to mean any failure in the signal system, either on the infrastructure or on the rolling stock, that results in a less restrictive signal than required.
- *Passing a stop signal* is understood to mean any situation where any part of the train travels further than allowed.
- *Broken wheels and axles* is understood to mean a breakage that affects the key components of the wheel or axle, thereby creating a risk of accident in the form of derailment or collision.

Personal injury

- *Passenger* is understood to mean anyone who undertakes a journey by railway, excluding train staff. In accident statistics this also includes persons who attempt to board or alight from a moving train.
- *Staff, including contract staff* is understood to mean any person employed in connection with a railway and who is at work at the time of the accident. The definition includes train staff and persons operating rolling stock and infrastructure plant.
- *Level-crossing users* is understood to mean anyone who uses a level crossing to cross the railway with the help of a vehicle or on foot.
- *Persons on railway property without permission* is understood to mean all persons on railway property where this is prohibited, excluding level-crossing users.
- *Other persons* is understood to mean all persons not covered by the definitions of passenger, staff, level-crossing users or persons on railway property without permission.

Type of injury

- *Fatality* is understood to mean a person who is killed immediately or dies within 30 days as a result of an accident. Suicides are not included.
- *Seriously injured person* is understood to mean a person who has been admitted to hospital for more than 24 hours as a result of an accident. Attempted suicides are not included.
- *Less seriously injured person* is understood to mean a person who has suffered injury. Deaths and serious injuries are not included.

Costs

- *Costs of environmental damage* is understood to mean costs that must be met by railway undertakings and infrastructure managers, estimated on the basis of their experience, in returning a damaged area to its condition before the railway accident.

– *Costs of material damage to rolling stock or infrastructure* is understood to mean the costs of purchasing new rolling stock or constructing new infrastructure with the same functionality and technical parameters as the rolling stock or infrastructure damaged in the accident, as well as the costs of returning rolling stock or infrastructure that can be repaired to its condition prior to the accident. Both parts must be estimated by the railway undertakings and infrastructure managers on the basis of their experience. Costs of leasing rolling stock to replace damaged vehicles that are not available are also covered by this definition.

Level crossings

– *Level crossing with automatic protection or user-side warning signal system* is understood to mean a level crossing where the protection or warning signal is activated by the approaching train.

– *Track-side protection* is understood to mean a signal or other operational safety system that only allows trains to pass if the level crossing is protected on the user side, and no one is about to cross; this is checked by means of monitoring or detection of obstacles.

– *Level crossing with manually operated protection or warning signal system* is understood to mean a level crossing where the protection or warning signal system is activated manually and is not linked to a railway signal that only allows the train to pass if the protection or warning signal system has been activated.

– *Unprotected level crossing* is understood to mean a level crossing where no form of warning system or protection is activated if users cannot use the crossing safely.

Annex 4: Safety indicators for 2010

Data

The statistical data in the annex were recorded by railway undertakings and railway infrastructure managers in the period 2006-2010. Some of the figures in the report are based on data that go back to 1999, but data for private and local lines is only available to a limited extent before 2003.

Data are reported in accordance with the Reporting Executive Order (Order No 575 of 25 May 2010). The definitions used can be found in annex 2 and are described in greater detail in the guidelines on the reporting of accidents, precursors to accidents and safety irregularities.

Some categories of data contain relatively small quantities of data, and can give rise to big fluctuations in the statistics from year to year. This is why 5-year cumulative averages are calculated for comparison with annual figures.

Calculation methods and definitions have changed in the course of the last 5-year period, and the statistical information may be subject to a certain degree of inaccuracy. The tables use () to indicate calculations of 5-year averages where data are unreliable.

Current overview of national safety indicators

Table 5. Safety indicators for 2010

Indicators	Total in 2010	Total in 2010/million train-km	5-year average/million train-km
Significant accidents	22	0.27	0.30
Minor accidents	487	5.88	8.68
Precursors to accidents	594	7.69	10.46
Safety irregularities	2521	33.28	35.76
Persons killed	10	0.12	0.16
Serious injuries	8	0.10	0.14
Suicides	23	0.28	0.33

Table 5. Safety indicators for the railways. Significant accidents are recorded in situations giving rise to serious personal injuries, damage in excess of DKK 1.2 million or significant delays to traffic. The figures for persons killed exclude suicides.

Table 6. Indicators relating to significant accidents

Significant accidents	Total in 2010	Total in 2010/million train-km	5-year average/million train-km
Collision of trains	1	0.01	0.01
Derailement	1	0.01	0
Level-crossing accidents	9	0.11	0.07
Accidents involving persons	10	0.12	0.18
Fire	0	0	0
Other	1	0.01	0.04

Table 6. Significant accidents are recorded in situations giving rise to serious personal injuries or material damage in excess of DKK 1.2 million. The total number of accidents in 2010 was 22.

Table 7. Indicators relating to persons killed

Persons killed	Total in 2010	Total in 2010/million train-km	5-year average/million train-km
Passengers	0	0	0
Staff	0	0	0*
Level-crossing users	4	0.05	0.05
Persons on railway property without permission	6	0.07	0.09
Other	0	0	0.01

Table 7. The figures for persons killed do not include suicides. *zero indicates that the 5-year average is extremely small (< 0.01).

Table 8. Indicators relating to serious injuries

Serious injuries	Total in 2010	Total in 2010/million train-km	5-year average/million train-km
Passengers	1	0.01	0.04
Staff	0	0	0.02
Level-crossing users	4	0.05	0.03
Persons on railway property without permission	3	0.04	0.04
Other	0	0	0*

Table 8. The figures for serious injuries do not include attempted suicides. * zero indicates that the 5-year average is extremely small (< 0.01).

Table 9. Indicators relating to minor accidents

Minor accidents	Total in 2010	Total in 2010/ million train-km	5-year average/million train-km
Collision of trains	149	1.81	(5.24)
Derailment	56	0.68	0.84
Level-crossing accidents	15	0.18	0.27
Accidents involving persons	52	0.63	0.54
Fire	135	1.64	1.33
Accidents involving spillage of dangerous goods	1	0.01	0.01
Other accidents	79	0.96	0.47

Table 9. Minor accidents not causing serious injuries and where any material damage is below DKK 1.2 million.

Table 10. Indicators relating to precursors to accidents

Precursors to accidents	Total in 2010	Total in 2010/ million train-km	5-year average/million train-km
Broken rails	49	0.60	(0.33)
Track buckles	4	0.05	0.05
Signal failure	61	0.74	(2.39)
Signals passed at danger	467	5.68	6.93
Broken wheels and axles	12	0.15	0.21
Incidents involving dangerous goods	1	0.01	0.14

Table 10. Figures for precursors to accidents with no harmful consequences.

Table 11. Indicators in connection with safety irregularities

Safety irregularities	Total in 2010	Total in 2010/ million train-km	5-year average/million train-km
Risk of collision with person	327	3.98	(3.53)
Fault in braking system	53	0.65	(0.89)
Irregularity at level crossing	132	1.61	(1.29)
Deformation of tracks	10	0.12	(0.21)
Signalling error	200	2.43	(6.60)
Gauge conditions	188	2.29	(2.70)
Vandalism	237	2.88	(3.97)
Other	1374	16.73	(13.90)

Table 11. Figures for safety irregularities with no harmful consequences.

Annex 5: Certification, safety authorisation and supervision

Safety certification of railway undertakings

Table 12. Safety certificates part A

		New	Updated/ amended	Renewed	Issued previously
Number of valid safety certificates part A issued to railway undertakings in 2010	Registered in Denmark	0	0	0	12
	Registered in other Member States	0	0	0	0

Table 12. Figures for safety certificates part A (cf. Directive 2004/49/EC) in 2010

Table 13. Safety certificates part B

		New	Updated/ amended	Renewed	Issued previously
Number of valid safety certificates part B issued to railway undertakings in 2010	Registered in Denmark	1	1	0	13
	Registered in other Member States	0	0	0	0

Table 13. Figures for safety certificates part B (cf. Directive 2004/49/EC) in 2010

Table 14. Applications for safety certificates part A ²⁵.

			A	R	P
Number of applications for safety certificates part A submitted by railway undertakings in 2010	Registered in Denmark	New certificates	0	0	0
		Updated/amended certificates	0	0	0
		Renewed certificates	0	0	0
	Registered in other Member States	New certificates	0	0	0
		Updated/amended certificates	0	0	0
		Renewed certificates	0	0	0

Table 14. Applications for safety certificates part A in 2010, broken down into accepted (a), rejected (r) and pending (p). Note that a safety certificate part A issued in 2010 may be the outcome of an application in a previous year.

²⁵ A: Application accepted, certificate issued. R: Application rejected, no certificate issued. P: case pending, no certificate issued as yet.

Table 15. Applications for safety certificates part B²⁶

			A	R	P
Number of applications for safety certificates part B submitted by railway undertakings in 2010	Registered in Denmark	New certificates	0	0	0
		Updated/amended certificates	0	0	0
		Renewed certificates	0	0	0
	Registered in other Member States	New certificates	1	0	0
		Updated/amended certificates	1	0	0
		Renewed certificates	0	0	0

Table 15. Applications for safety certificates part B in 2010, (broken down into accepted (a), rejected (r) and pending (p)). Note that a safety certificate part B issued in 2010 may be the outcome of an application in a previous year.

Safety authorisation of railway infrastructure managers

Table 16. Safety authorisation

	New	Updated/ amended	Renewed	Issued previously
Number of valid safety authorisations issued to infrastructure managers by the Danish Transport Authority in 2010	3	1	0	5

Table 16. Number of safety authorisations in 2010.

Table 17. Safety authorisations

		A	R	P
Number of applications for safety authorisation submitted to the Danish Transport Authority by infrastructure managers in 2010	New certificates	3	0	3
	Updated/amended certificates	1	0	0
	Renewed certificates	0	0	0

Table 17. Number of safety authorisations in 2010 broken down into A: Applications accepted, authorisation issued. R (rejected): applications rejected, no authorisation issued. P (pending): case pending, no authorisation issued as yet.

²⁶ A: Application accepted, certificate issued. R: Application rejected, no certificate issued. P: case pending, no certificate issued as yet.

Annex 6: Authorisation of rolling stock

Table 18. Authorisation of rolling stock in 2010

Authorisations	Number
Traction units, locomotives and trainsets	73
Passenger wagons	2
Goods wagons	2
Special vehicles	127
Transport and trial runs	23
Safety rules	29
Total	256

Table 18. An authorisation can cover several vehicles.

Annex 7: Amendments to legislation and regulations

Table 19. Amendments to legislation and regulations in 2010

Legislation	Instrument	Date of entry into force	New or amended legislation	Comments
Railways Act	Act No 553 of 26 May 2010	1 July 2010	Amending legislation	The amendments mean, <i>inter alia</i> , that in future the Danish Transport Authority will be able to lay down rules on exemptions for certain safety-related matters. The change in the law also establishes a Railways Board, and authorises the Danish Transport Authority to lay down rules on non-commercial railway operation (historic lines).
Railways Act	Act No 726 of 25 June 2010	Day after publication in the Gazette	Amending legislation	The amendments concern, <i>inter alia</i> , the abolition of the Banedanmark Board.
Provisions on operation on railway infrastructure with train control	BJ 5-1-2010	1 February 2010	New BJ	The BJ stipulates that railway infrastructure managers may define more specific requirements for operating trains without mobile train control systems on lines with fixed train control systems. The BJ also contains a continuing general rule on max. speed for operating without a mobile train control system. The rules also apply to historic trains.
Provisions implementing technical specifications for interoperability (TSI) for sub-systems in trans-European conventional and high-speed rail systems	BJ 5-2-2010	1 April 2010	New BJ	The BJ implements the latest amendments and brings together all amendments made to the Technical Specification for Interoperability for train control and signals (TSI CCS) since their adoption in 2006.
Executive Order on breath tests in accordance with the Railways Act	Executive Order No 276 of 25 March 2010	1 April 2010	New executive order	The Order describes the specific circumstances that must be in place if the police carry out a breath test on a safety-classified

				person.
Executive Order on interoperability in the railway system	Executive Order No 459 of 28 April 2010	3 May 2010	New executive order	The Order implements the Interoperability Directive (2008/57/EC) and amendments to this directive (Directive 2009/131/EC and Commission Decision 2009/965/EC).
Executive Order on the approval of railway infrastructure	Executive Order No 504 of 12 May 2010	16 May 2010	New executive order	The Order describes the Danish Transport Authority's practice relating to authorisation to place infrastructure in service and has been brought into line with more recent European law.
Executive Order on Danish Transport Authority fees	Executive Order No 523 of 20 May 2010	26 May 2010	New executive order	The Order stipulates a "supplementary bill" principle with ceiling for calculating fees for issuing and renewing safety certificates and authorisations.
Executive Order amending the order implementing the Railway Safety Directive	Executive Order No 566 of 25 May 2010	18 June 2010	Amending executive order	The Order implements the revised Annex 1 of the Railway Safety Directive (Directive 2009/149/EC), which deals with Common Safety Indicators (CSI) for assessing whether Common Safety Targets (CST) have been achieved.
Executive Order on the reporting of data on accidents, precursors to accidents and safety irregularities, etc. to the Danish Transport Authority	Executive Order No 575 of 25 May 2010	1 January 2011	New executive order	The Order implements parts of the Railway Safety Directive and reduces the administrative burden on undertakings.
Executive Order on the registration of railway vehicles	Executive Order No 838 of 28 June 2010	2 July 2010	New executive order	The Order lays down requirements for the registration of vehicles in a vehicle register (NVR), as specified in the Interoperability Directive (2008/57/EC).
Executive Order on liability for safety measures at level crossings on Banedanmark's network that are open to general traffic	Executive Order No 1094 of 21 September 2010	1 October 2010	New executive order	The Order governs Banedanmark's liability as infrastructure manager and the Danish Transport Authority's liability as authority for road-related safety measures.
Executive Order regulating compensation and insurance amounts under the Railways Act	Executive Order No 1273 of 18 November 2010	1 January 2011	New executive order	The Order governs the annual compensation and insurance amounts for railway undertakings' and infrastructure

				managers' mandatory liability insurance.
Executive Order on non-commercial railway operation (Historic Lines Executive Order)	Executive Order No 1354 of 2 December 2010	14 December 2010	New executive order	The Order brings together the Danish Transport Authority's practices in the area and lays down conditions for running a non-commercial railway operation.
Executive Order amending the executive order on interoperability in the railway system	Executive Order No 1357 of 2 December 2010	14 December 2010	Amending executive order	The amendment concerns the exemption of historic line infrastructure and historic train vehicles from the scope of the Interoperability Directive.
Executive Order amending the executive order on the registration of railway vehicles	Executive Order No 1358 of 2 December 2010	14 December 2010	Amending executive order	The amendment concerns the exemption from the registration requirement of vehicles on privately owned railway infrastructure, historic line infrastructure and infrastructure from which public traffic is barred in connection with maintenance.
Order amending the Executive Order on liability insurance for railway undertakings and railway infrastructure managers	Executive Order No 1359 of 2 December 2010	14 December 2010	Amending executive order	The amendment concerns a clarification in relation to historic lines.
Executive Order implementing the Railway Safety Directive	Executive Order No 1293 of 23 November 2010	14 December 2010	New executive order	The Order alters the scope of the Safety Directive in Denmark (e.g. privately owned railway infrastructure that is only used for the owner's own goods operations and historic lines are exempt from the Safety Directive). The most important amendment to the Safety Directive concerns responsibility for ensuring that vehicles are properly maintained.
Executive Order on European critical infrastructure in the railway sphere (EPCIP Directive)	Executive Order No 1461 of 14 December 2010	10 January 2011	New executive order	The Order implements Directive 2008/114/EC on the isolation and designation of European critical infrastructure and the assessment of the need for more effective protection therefor (i.e. the provisions of the Directive relating to European critical infrastructure in <i>the railway sphere</i>).

Table 19. The summary shows where amendments have been made to acts or regulations with reference to the relevant instrument and a short description of what the amendment involved.

Safety on the railways in Denmark in 2010 remains high. There were few accidents involving persons, but there are still challenges that must be addressed. The safety report focuses on a supervision strategy and on supervision of railway undertakings and railway infrastructure managers. The report describes how safety on the Danish railways is developing, and how the principles of risk assessment are becoming increasingly important in managing safety on the railways.

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