

**Analysis\* of commercial  
vehicle accidents  
in Germany in year 2004  
with regard to the fitment of  
electronic vehicle stability  
systems (ESP)**



**Knorr-Bremse, 3rd March 2006**

**\*Sources:**

- IRTAD  
(International Road Traffic & Accident Data database)
- Statistisches Bundesamt  
(German Government Statistics Office)
- Bundesanstalt für Straßenwesen  
(German Federal Research Institute for Highways)



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## Introduction

The data presented in this accident statistics analysis shows the relationship of commercial vehicle road user deaths to total road user deaths in specific European countries, including Germany. The accident data for Germany, published by the German Government Statistics Office, is then specifically analysed with respect to:

- accidents that are considered to be significantly relevant to the application of an electronic vehicle stability system (ESP),
- specific vehicle types (N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub>),
- road conditions (dry, wet, mud/snow and ice), and
- personal injuries (killed, severely injured and injured).

While it is not possible to say that ESP would have prevented or minimised all the considered accidents, or that there were no accidents in the categories that were not considered that would have benefited from the fitment of ESP.

The costs for these identified accidents are then indicated using figures published by the German Federal Research Institute for Highways.

Although it is again not possible to say that the saving of these costs would actually result from the fitment of ESP, they are based on average accident costs and as the vast majority of accidents are passenger car accidents these figure will be conservative when considering that medium/heavy commercial vehicle accidents will have a higher average cost.

The costs related to accidents involving ADR vehicles will on average be higher again when considering environmental clean-up costs.

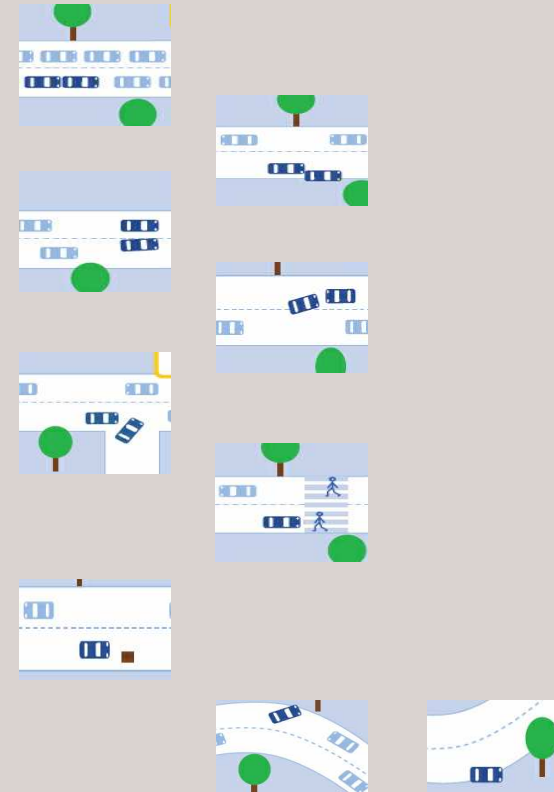
## Analysis summary

### In Germany:

- **≈14 % of all road user fatalities in 2003 involved commercial vehicles >3.5t**
- **In 2004 commercial vehicles >3.5t were involved in 23277 accidents**
- **In 2004, 12339 accidents involved commercial vehicles of categories N<sub>2</sub> (42%), N<sub>3</sub> (43%) and M<sub>3</sub> (15%)**
- **Of the 12339 accidents, 1411 (11%) are considered to be ESP relevant**
- **The number of persons injured or killed in the 1411 accidents is 1760 (11%) with 56 deaths**
- **36% of the 1411 accidents were N<sub>2</sub> trucks without trailer and 33 % were N<sub>3</sub> tractors with semi-trailer. Personal injuries were 35% and 32% respectively**
- **Personal injury costs for the 1760 person injured or killed was ≈ € 109,000,000 with the 56 deaths accounting for 60%**
- **Property damage costs for the 1411 accidents was ≈ € 17,000,000**
- **Total personal injury and property damage costs for the 1411 accidents was ≈ € 126,000,000**
- **Of the 1411 accidents, 32 involved ADR vehicles**
- **The personal injury costs of the 32 accidents involving ADR vehicles was ≈ € 1,300,000. Note, the property damage costs for the ADR accidents include in the € 17,000,000 do not represent the true costs as they are based on average all accidents costs.**

## Types of accidents analysed in detail in Germany in year 2004

- Collision with another vehicle,
  - running into back of moving or slowing/stationary vehicle
  - running into pulling-out or parked vehicle
  - turning into overtaking vehicle
  - running into oncoming vehicle
  - running into vehicle joining traffic flow at side junction / X roads
- Collision of vehicle with pedestrian(s)
- Collision with obstacle in the same lane
- Curve departure left side / right side
- Accidents for other reasons



Source: Statistisches Bundesamt, year 2004

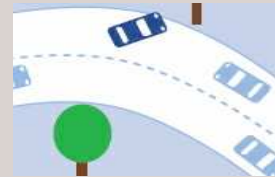
## Types of accidents which have been chosen to be significantly ESP relevant

- Collision with obstacle in the same lane



- Curve departure

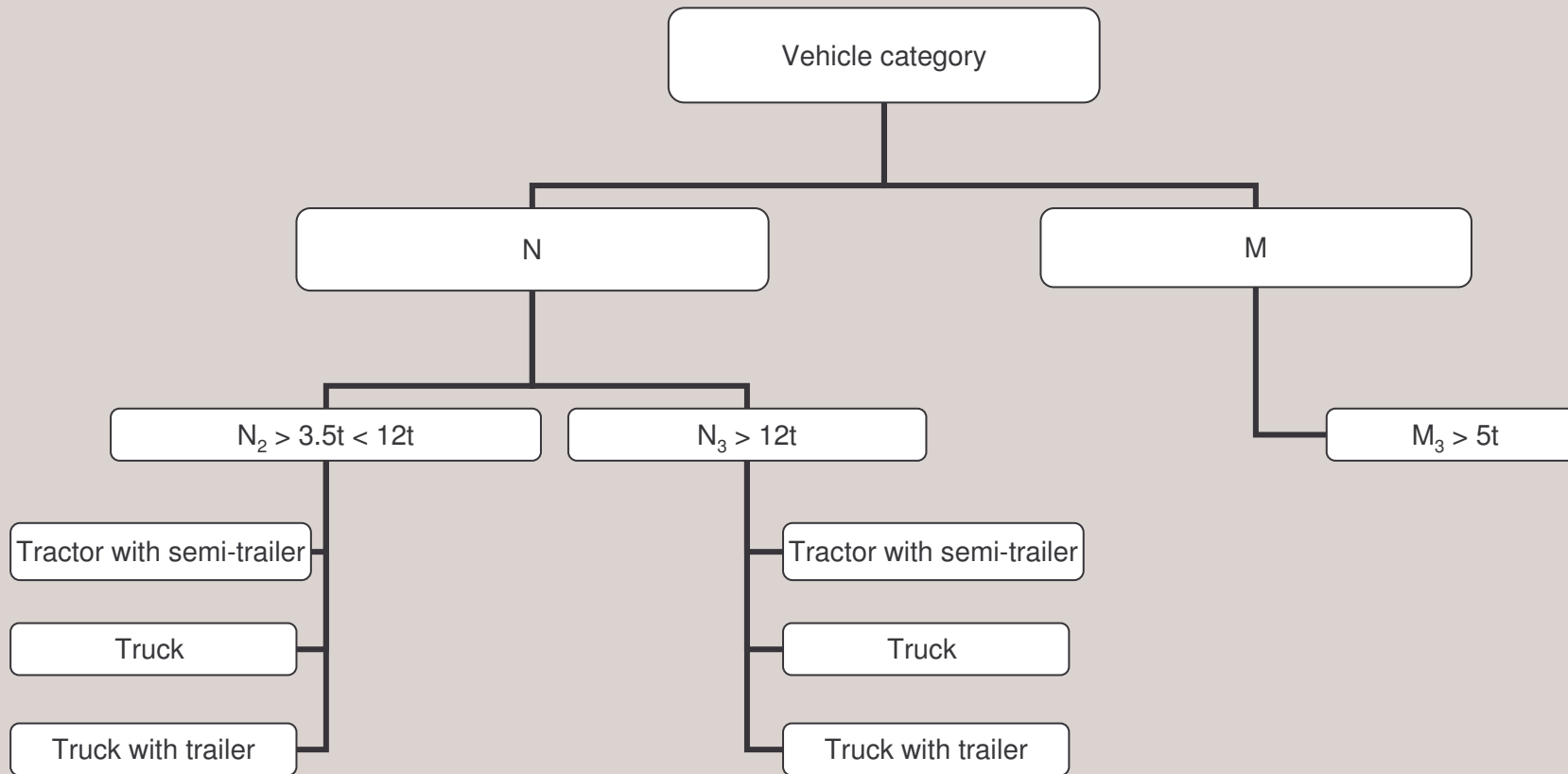
left side



right side

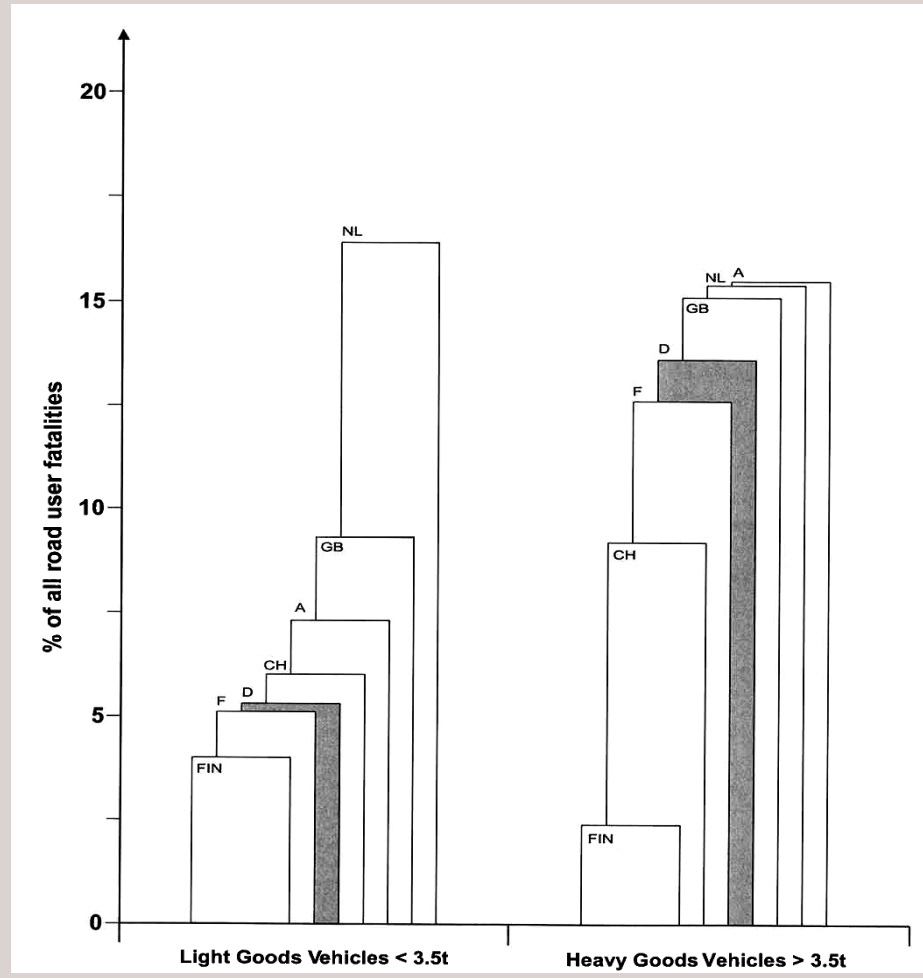


# Vehicle types considered in this detailed analysis of accidents in Germany in year 2004



Source: Statistisches Bundesamt, year 2004

# Fatalities from accidents involving goods vehicles in 2003

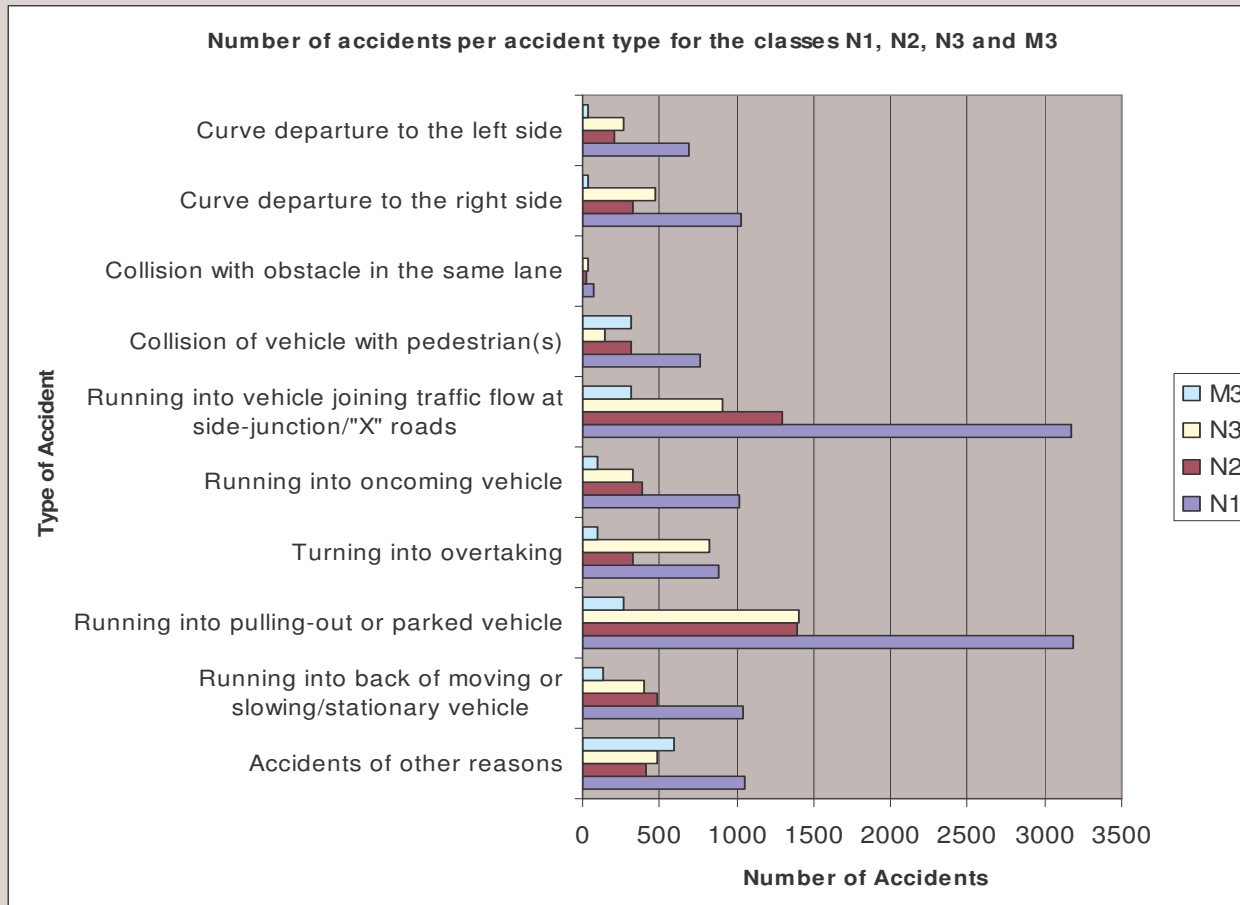


Source: IRTAD



Accident analysis data

# Number of accidents per accident type analysed in detail in Germany in 2004 for vehicles of the classes N<sub>1</sub>, N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub>



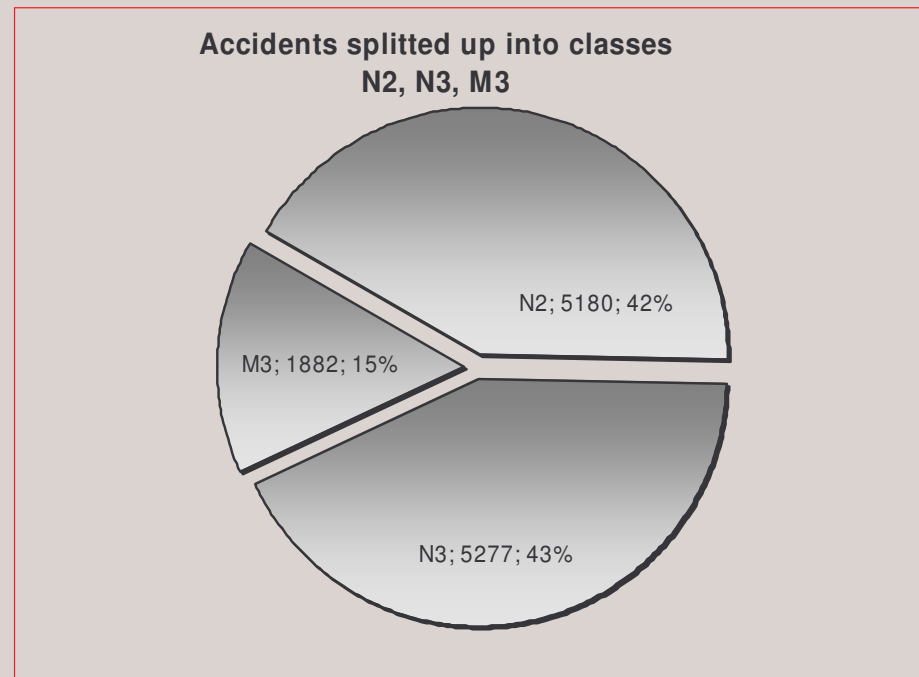
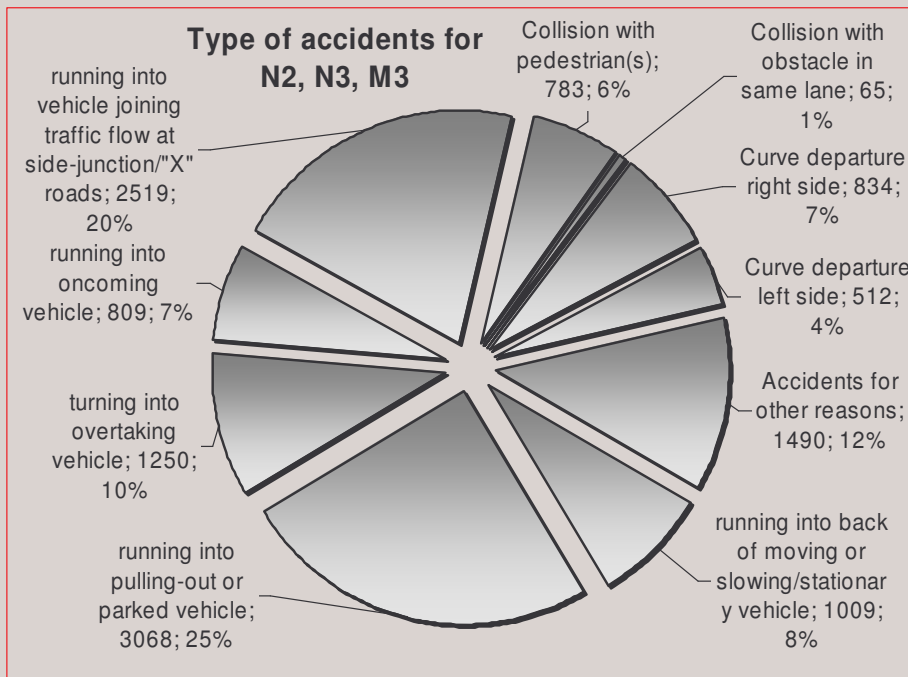
Total accidents: 23,377s

Source: Statistisches Bundesamt, year 2004



Accident analysis data

# Types of accidents analysed in detail in Germany in year 2004 for vehicles of the classes N<sub>2</sub>, N<sub>3</sub>, and M<sub>3</sub>



Source: Statistisches Bundesamt, year 2004



## N<sub>2</sub>; ≥ 3.5t, ≤ 12t Truck (without trailer) All road conditions (dry, wet, mud/snow and ice)

- Accidents considered ESP relevant:

507 (2 with ADR goods)

Persons injured: 439

Persons severely injured: 165

Persons killed: 18

thereof

- Collision with obstacle in same lane:

19



- Curve departure to the

right side:

296

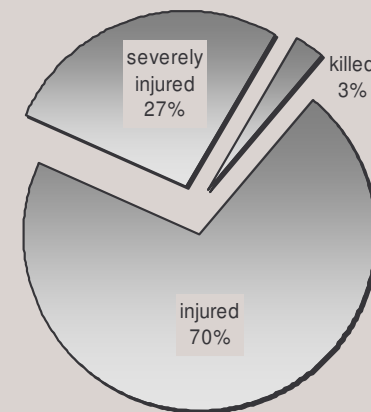


left side:

192



Persons injured, severely injured or killed



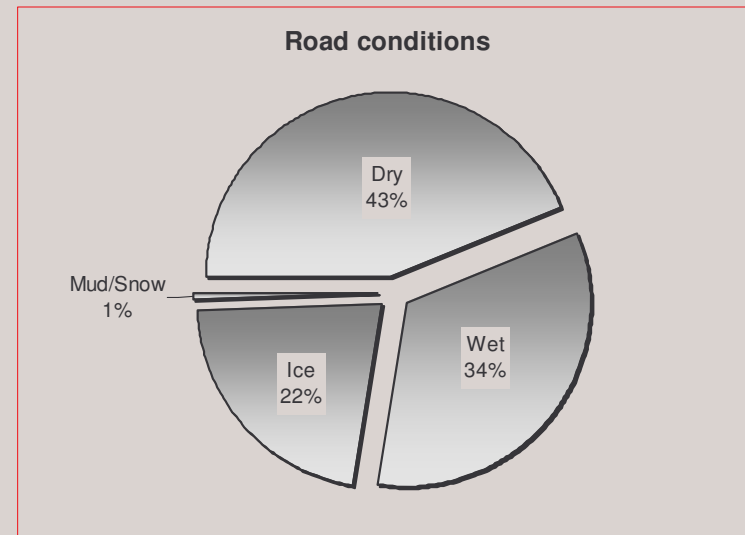
Source: Statistisches Bundesamt, year 2004

## N<sub>2</sub>; ≥ 3.5t, ≤ 12t Truck (without trailer)

- Accidents considered ESP relevant: 507 (2 with ADR goods)

### Accidents on following road conditions:

- Dry: 225
- Wet: 172
- Ice: 107
- Mud/Snow: 3



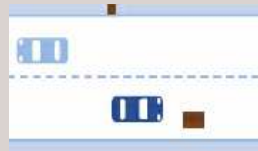
Source: Statistisches Bundesamt, year 2004

## N<sub>2</sub>; ≥ 3.5t, ≤ 12t Truck with trailer All road conditions (dry, wet, mud/snow and ice)

■ Accidents considered  
ESP relevant: 43

thereof

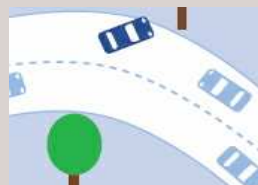
■ Collision with obstacle  
in same lane: 2



■ Curve departure to the  
right side: 29



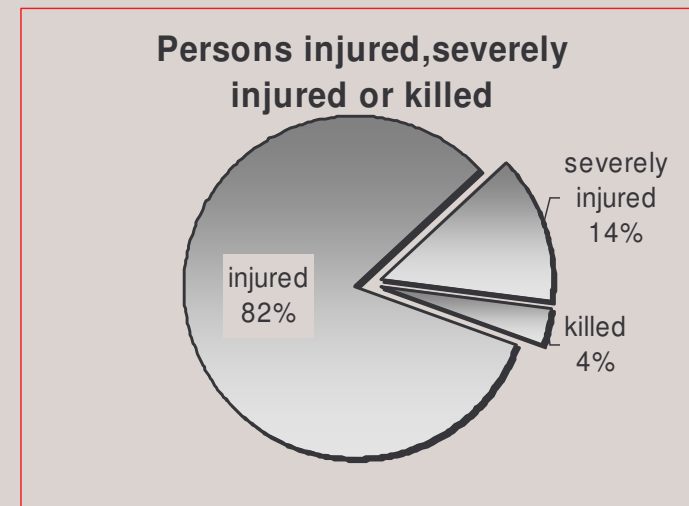
left side: 12



Persons injured: 47

Persons severely injured: 8

Persons killed: 2



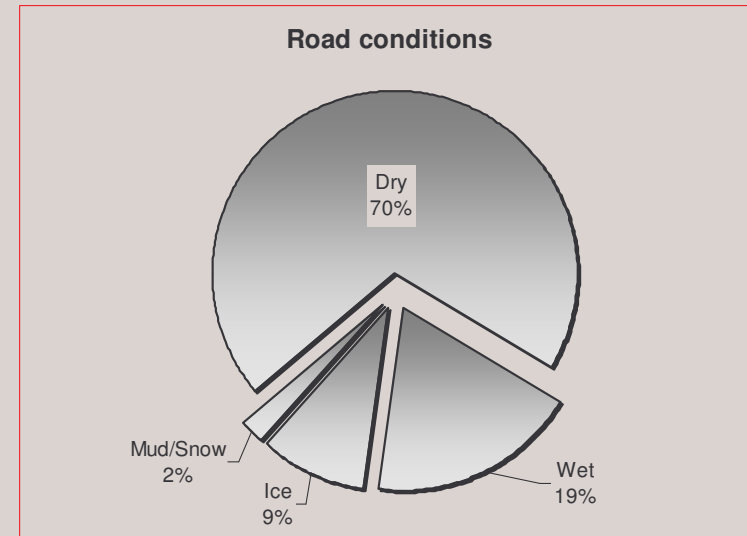
Source: Statistisches Bundesamt, year 2004

## N<sub>2</sub>; ≥ 3.5t, ≤ 12t Truck with trailer

- Accidents considered ESP relevant: 43

### Accidents on following road conditions:

- Dry: 30
- Wet: 8
- Ice: 4
- Mud/Snow: 1



Source: Statistisches Bundesamt, year 2004

## N<sub>2</sub>; ≥ 3.5t, ≤ 12t Tractor with semi-trailer All road conditions (dry, wet, mud/snow and ice)

■ Accidents considered  
ESP relevant: 2

thereof

■ Collision with obstacle  
in same lane: 0



■ Curve departure to the  
right side: 2



left side: 0

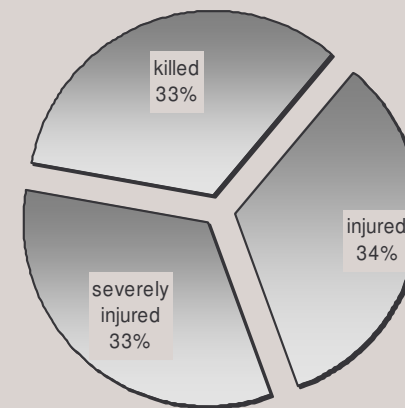


Persons injured: 1

Persons severely injured: 1

Persons killed: 1

Persons injured, severely injured or killed



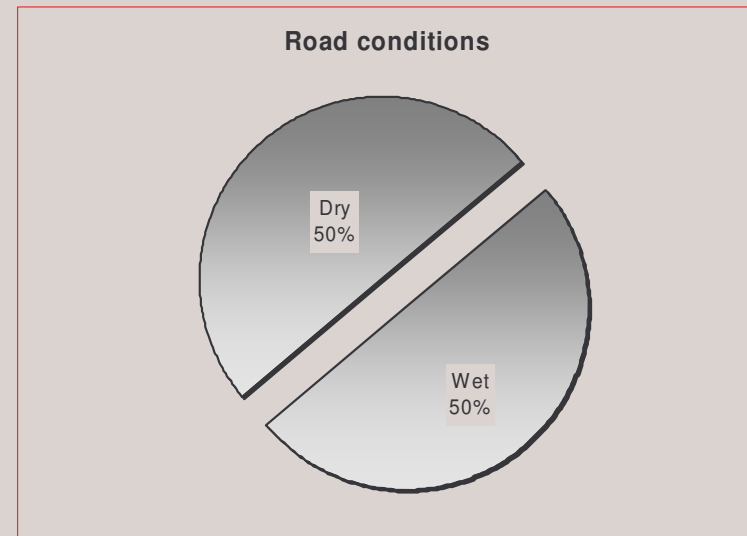
Source: Statistisches Bundesamt, year 2004

## $N_2; \geq 3.5t, \leq 12t$ Tractor with semi-trailer

- Accidents considered ESP relevant: 2

### Accidents on following road conditions:

- Dry: 1
- Wet: 1
- Ice: 0
- Mud/Snow: 0



Source: Statistisches Bundesamt, year 2004



## N<sub>3</sub>; > 12t Truck (without trailer) All road conditions (dry, wet, mud/snow and ice)

- Accidents considered ESP relevant:

135 (7 with ADR goods)

Persons injured: 104

Persons severely injured: 35

Persons killed: 5

thereof

- Collision with obstacle in same lane:

12



- Curve departure to the

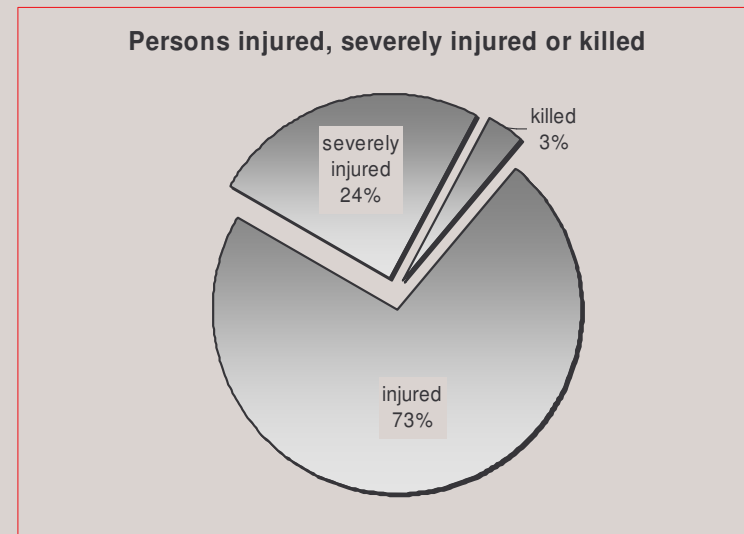
right side:

76



left side:

47



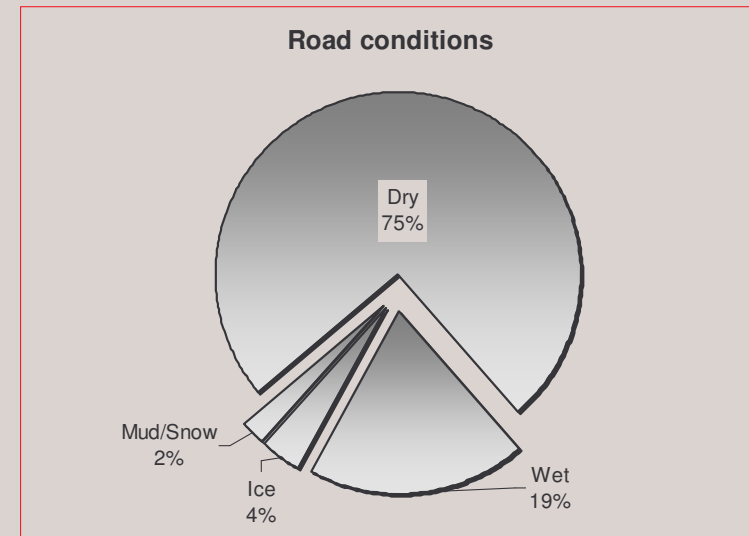
Source: Statistisches Bundesamt, year 2004

## N<sub>3</sub>; > 12t Truck (without trailer)

- Accidents considered ESP relevant: 135

### Accidents on following road conditions:

- Dry: 101
- Wet: 26
- Ice: 5
- Mud/Snow: 3



Source: Statistisches Bundesamt, year 2004

## N<sub>3</sub>; > 12t Truck with trailer All road conditions (dry, wet, mud/snow and ice)

■ Accidents considered ESP relevant: 173 (8 with ADR goods)

Persons injured: 133

Persons severely injured: 62

Persons killed: 9

thereof

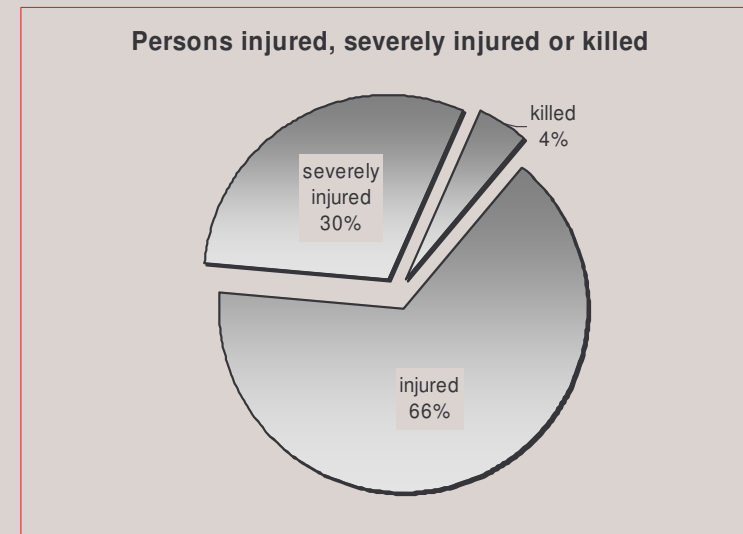
■ Collision with obstacle in same lane: 9



■ Curve departure to the right side: 111



left side: 53



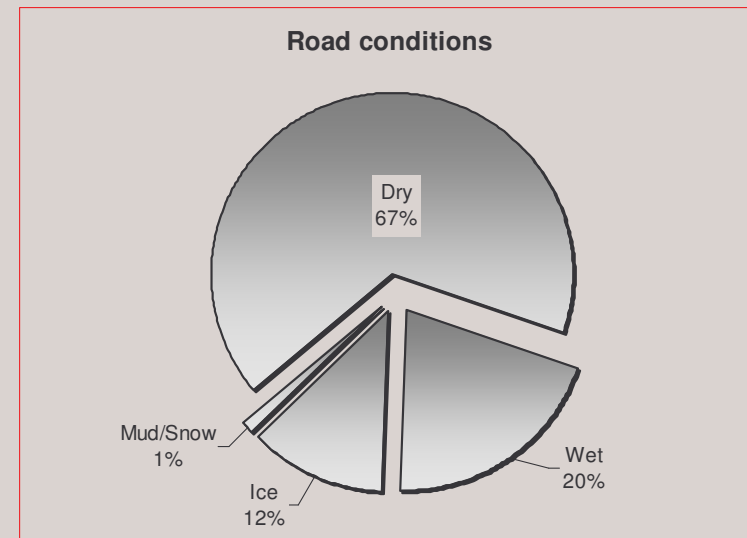
Source: Statistisches Bundesamt, year 2004

## N<sub>3</sub>; > 12t Truck with trailer

- Accidents considered ESP relevant: 173

### Accidents on following road conditions:

- Dry: 115
- Wet: 35
- Ice: 21
- Mud/Snow: 2



Source: Statistisches Bundesamt, year 2004

## N<sub>3</sub>; > 12t Tractor with semi-trailer All road conditions (dry, wet, mud/snow and ice)

- Accidents considered ESP relevant:

471 (15 with ADR goods)

Persons injured: 369

Persons severely injured: 169

Persons killed: 20

thereof

- Collision with obstacle in same lane:

20



- Curve departure to the

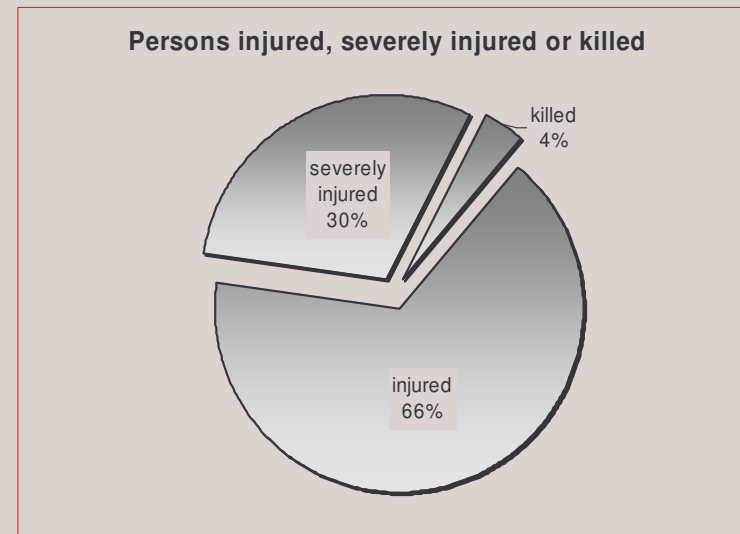
right side:

280



left side:

171



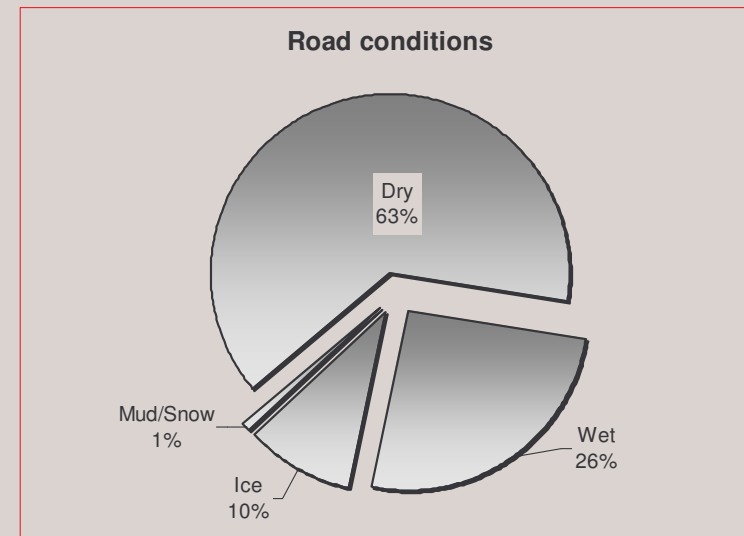
Source: Statistisches Bundesamt, year 2004

## N<sub>3</sub>; > 12t Tractor with semi-trailer

■ Accidents considered  
ESP relevant: 471

### Accidents on following road conditions:

■ Dry: 300  
■ Wet: 121  
■ Ice: 46  
■ Mud/Snow: 4



Source: Statistisches Bundesamt, year 2004

## M<sub>3</sub>; > 5.0t Bus All road conditions (dry, wet, mud/snow and ice)

■ Accidents considered ESP relevant: 80

thereof

■ Collision with obstacle in same lane: 3



■ Curve departure to the right side: 40



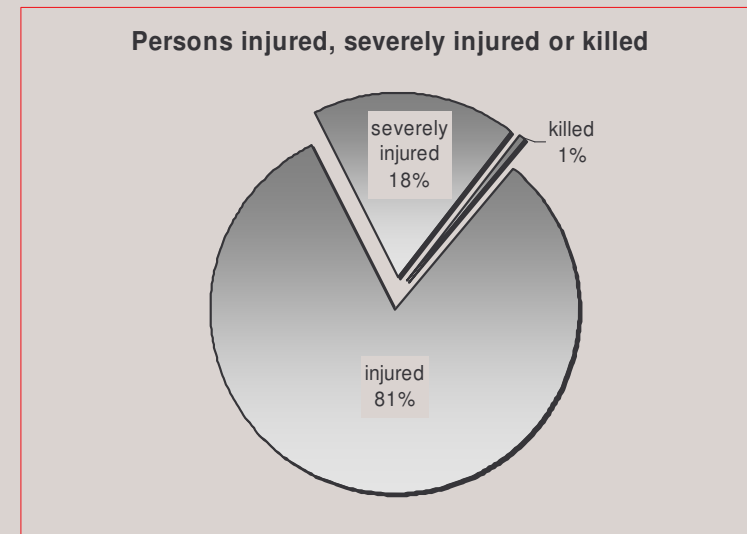
left side: 37



Persons injured: 140

Persons severely injured: 31

Persons killed: 1



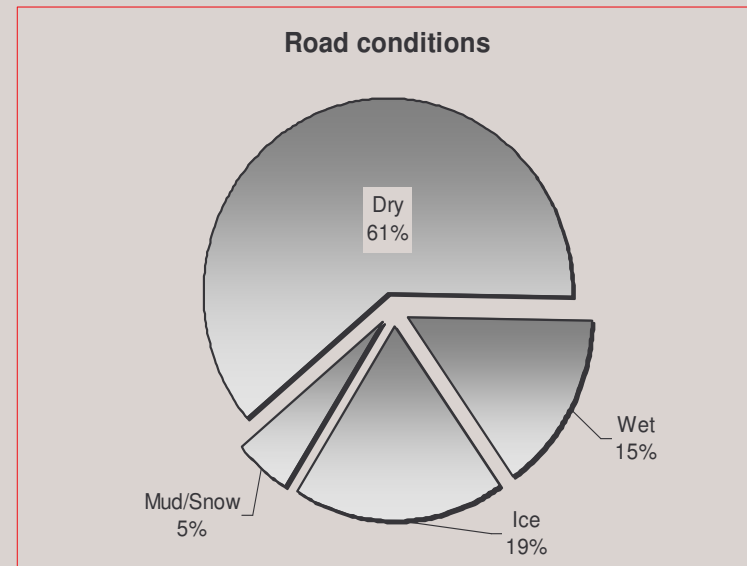
Source: Statistisches Bundesamt, year 2004

## M<sub>3</sub>; > 5.0t Bus

- Accidents considered ESP relevant: 80

### Accidents on following road conditions:

- Dry: 49
- Wet: 12
- Ice: 15
- Mud/Snow: 4



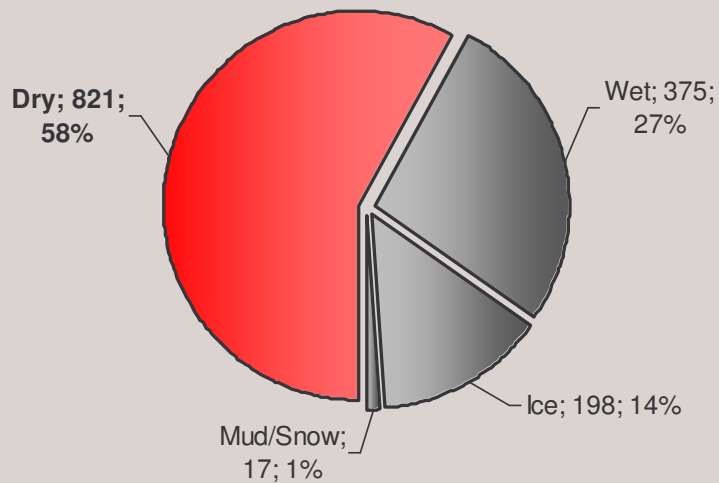
Source: Statistisches Bundesamt, year 2004



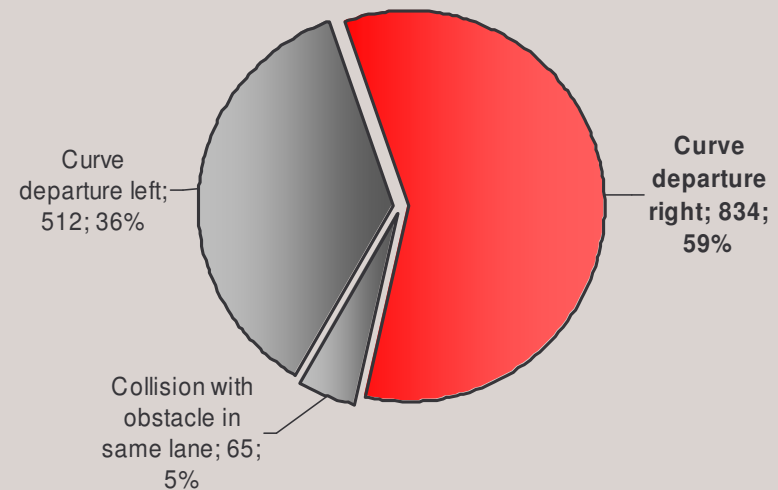
# Abstract of the analysed vehicles of the classes N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub> for year 2004

- Road condition
- Accident type

Road condition



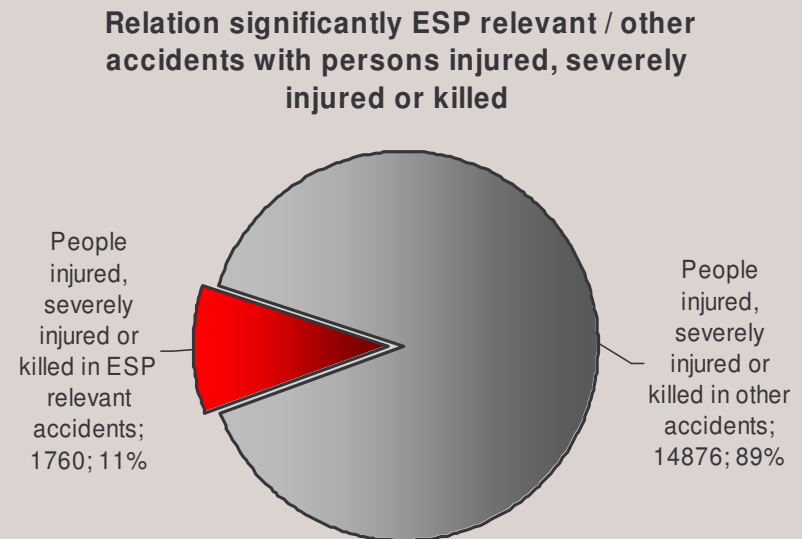
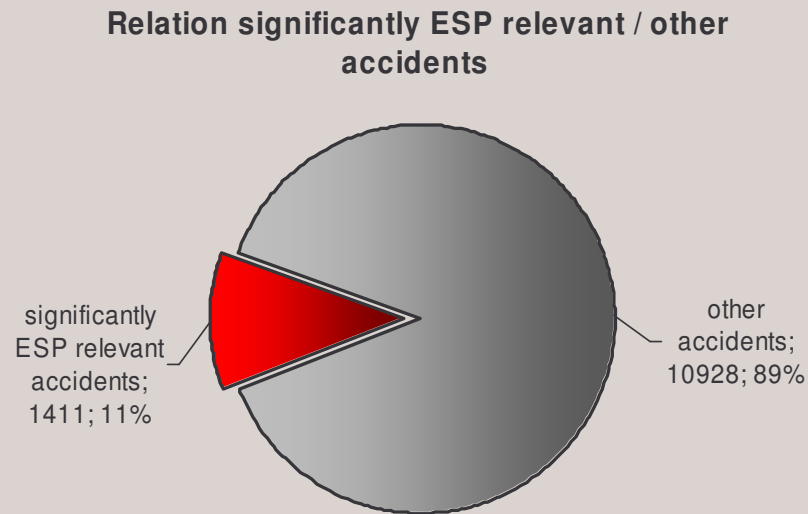
Accident type



Source: Statistisches Bundesamt, year 2004

## Abstract of the analysed vehicles of the classes N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub> for year 2004

- Relation of significantly ESP relevant accidents and other accidents
- Relation of significantly ESP relevant accidents and other accidents with persons injured, severely injured or killed



Source: Statistisches Bundesamt, year 2004

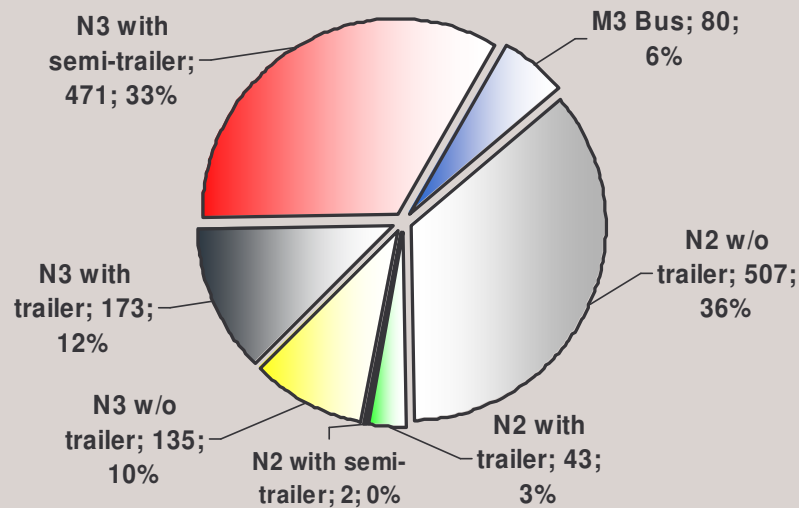
# Abstract of the analysed vehicles of the classes N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub> for year 2004

■ ESP relevant accidents in total: 1411

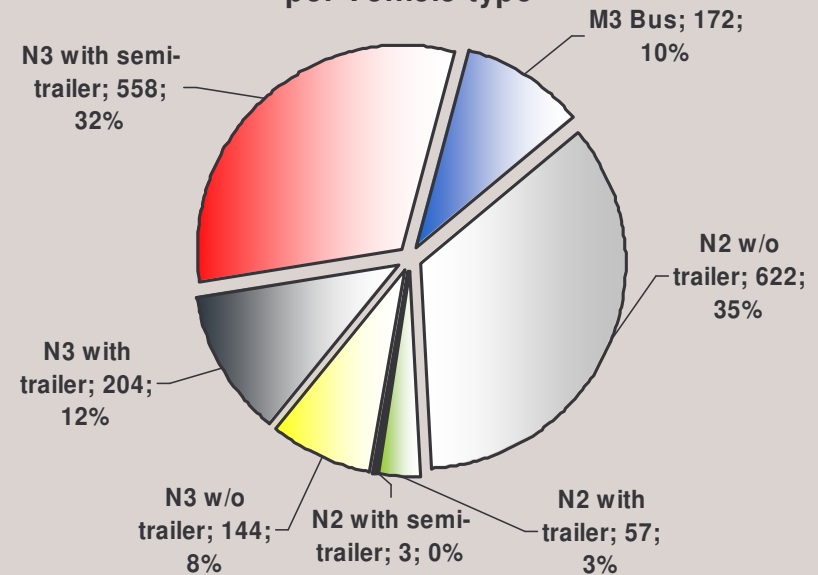
with number of

■ People injured, severely injured or killed: 1760 (56 deaths)

Numbers of ESP relevant accidents per vehicle type



Persons injured, severely injured or killed per vehicle type

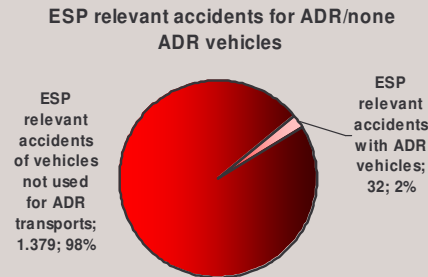


Source: Statistisches Bundesamt, year 2004

## Abstract of the analysed ADR vehicles of the classes N<sub>2</sub> and N<sub>3</sub> for year 2004 in terms of expense ratio for damage to persons

■ ESP relevant accidents in total: 1411

■ ESP relevant accidents with ADR vehicles: 32



The calculation model\* used in Germany shows the following:

Person injured:	3.755 €
Person severely injured:	83.972 €
Person killed:	1.164.119 €

ESP relevant ADR accidents:

Persons injured:	22
Persons severely injured:	14
Persons killed:	0

Costs for damage to persons:

82.610 €
1.175.608 €
<b>Σ 1.258.218 €</b>

■ Due to the impacts of costs for salvage, environment etc. it is recommended to evaluate the costs for each ADR - accident individually.

Source: Bundesanstalt für Straßenwesen

## Abstract of the analysed vehicles of the classes N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub> for year 2004 in terms of expense ratio for damage to persons

The calculation model used in Germany gives the following per person:

Person injured:	3.755 €
Person severely injured:	83.972 €
Person killed:	1.164.119 €

ESP relevant accidents:

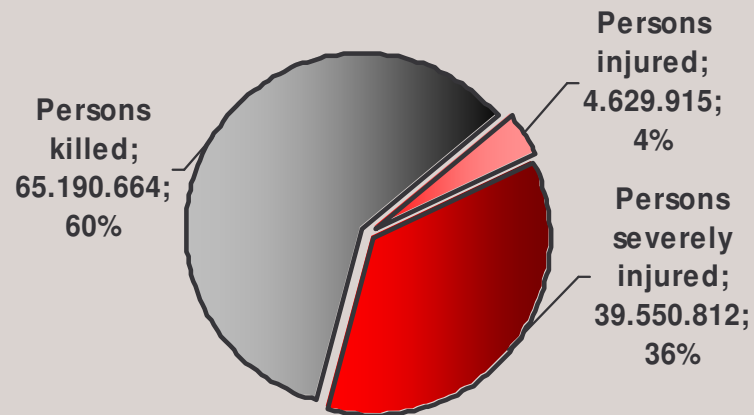
Persons injured:	1233
Persons severely injured:	471
Persons killed:	56

Costs in total:

4.629.915 €
39.550.812 €
65.190.664 €

Σ 1760      Σ 109.371.391 €

ESP relevant costs for damage to persons



Source: Bundesanstalt für Straßenwesen

## Abstract of the analysed vehicles of the classes N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub> for year 2004 in terms of expense ratio for damage to property

The calculation model\* used in Germany shows the following:

Accidents with injured persons:	10.084 €
Accidents with severely injured persons:	13.861 €
Accidents with killed persons:	27.892 €

ESP relevant accidents:

Accidents with injured persons:	950
Accidents with severely injured persons:	407
Accidents with killed persons:	54

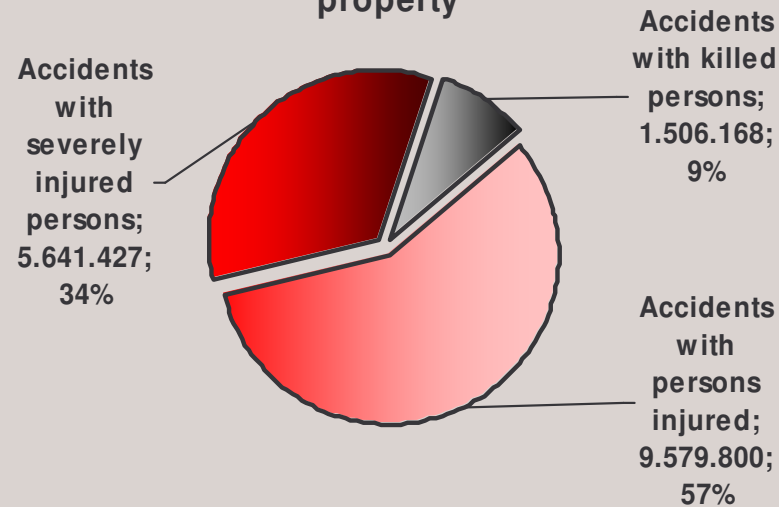
Costs in total:

9.579.800 €
5.641.427 €
1.506.168 €

Σ 1411

Σ 16.727.395 €

ESP relevant costs for damage to property

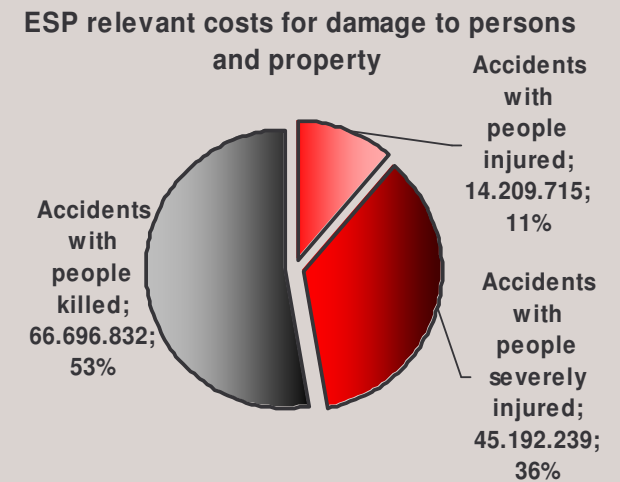
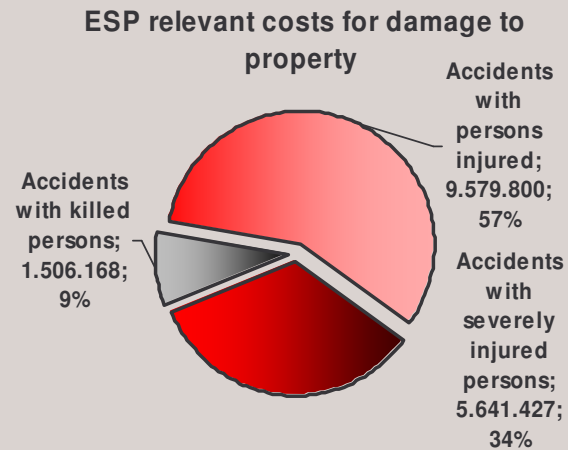
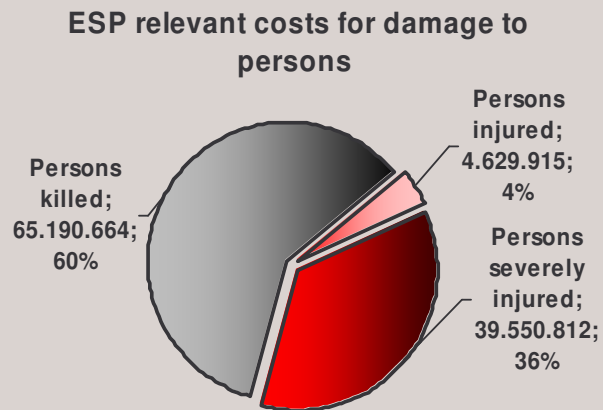


Source: Bundesanstalt für Straßenwesen

## Cost analysis data summary

# Abstract of the analysed vehicles of the classes N<sub>2</sub>, N<sub>3</sub> and M<sub>3</sub> for year 2004 in terms of expense ratio for damage to persons and property

	Costs for damage to persons:	Costs for damage to property:	Costs in total
Injuries	4.629.915 €	9.579.800 €	14.209.715 €
Severely injuries	39.550.812 €	5.641.427 €	45.192.239 €
Deaths	65.190.664 €	1.506.168 €	66.696.832 €
	$\Sigma$ 109.371.391 €	$\Sigma$ 16.727.395 €	$\Sigma$ 126.098.786 €



Source: Bundesanstalt für Straßenwesen

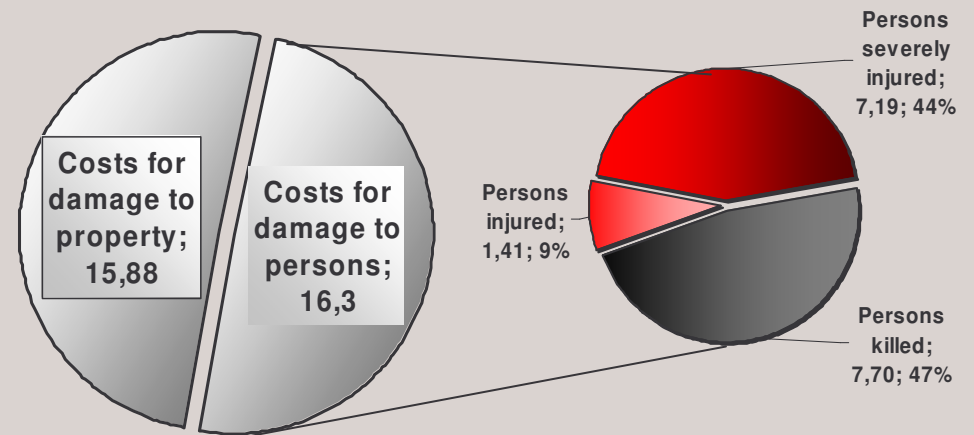
## Costs for economics caused by road accidents\* in Germany in year 2003: bn 32.2 €

■ Costs for damage to persons: bn 16.30 €

thereof

- killed: bn 7.70 €
- severely injured: bn 7.19 €
- injured: bn 1.41 €

■ Costs for damage to property: bn 15.88 €



Source: Bundesanstalt für Straßenwesen, \* all road accident costs