



# FULLY AUTOMATED ROAD FREIGHT -RTS, ENIRONMENTAL AND ECONOMIC BENEFIT

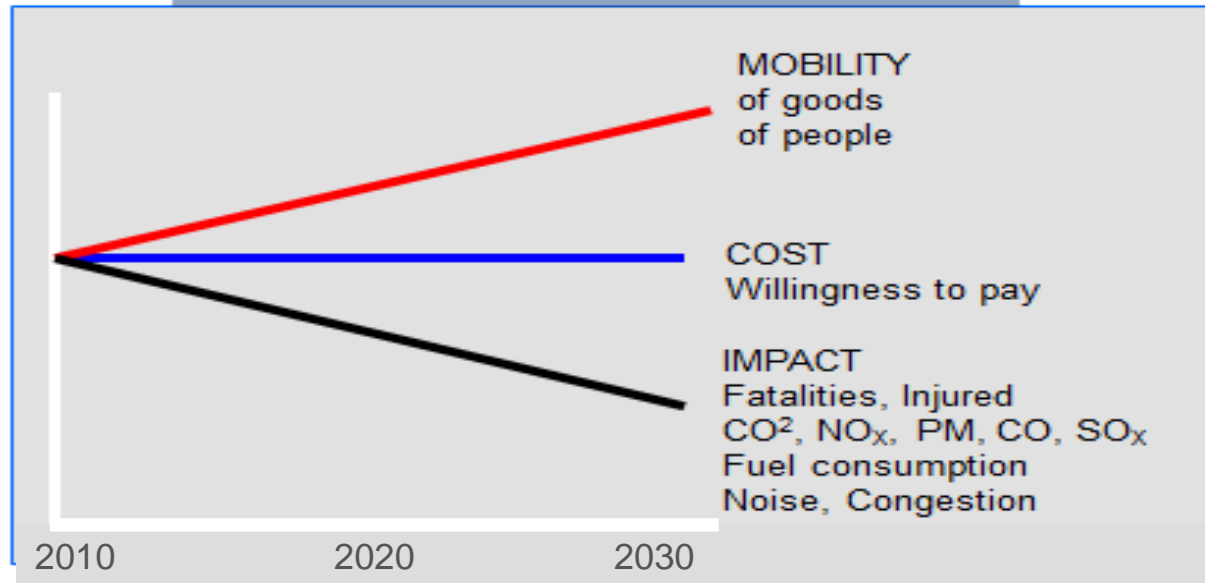
NORDISK TRAFIKSÄKERHETSFORUM, ÅLAND  
14 SEPTEMBER 2018

MÅRTEN JOHANSSON  
CTO  
SWEDISH ASSOCIATION OF ROAD TRANSPORT COMPANIES

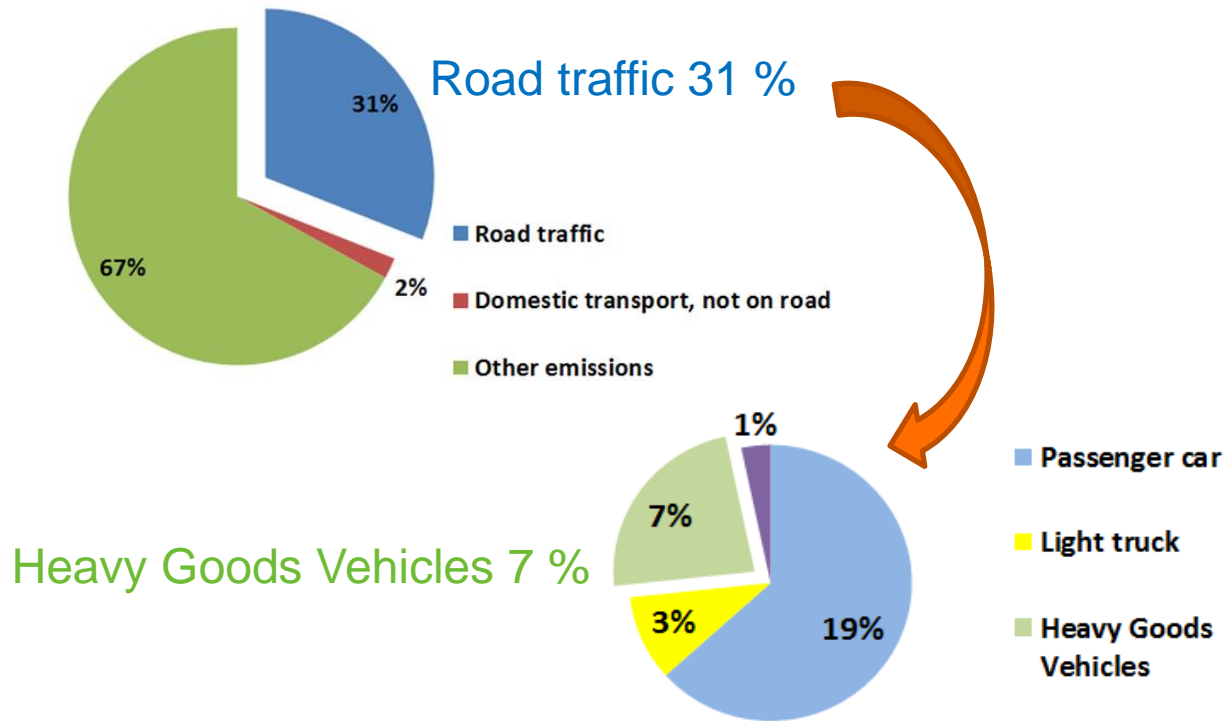




## The Challenge



## GHG EMISSIONS IN SWEDEN

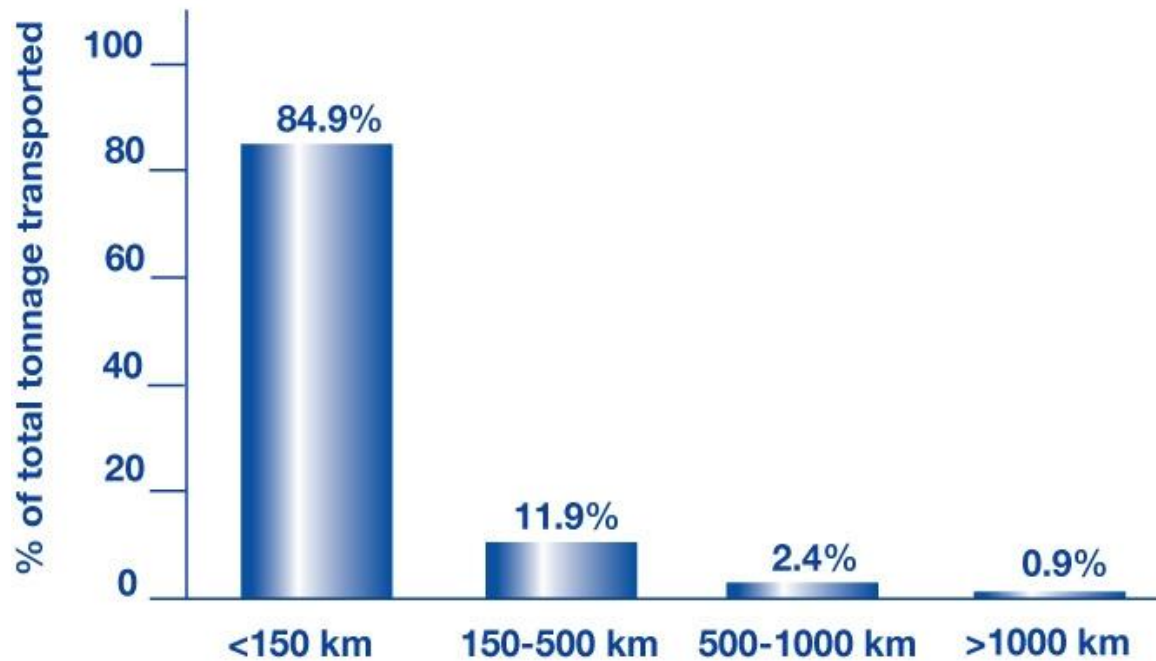


Source: KNEG





## EUROPEAN ROAD TRANSPORT TONNAGE DISTANCES IN MODERN ECONOMIES

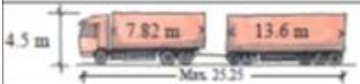
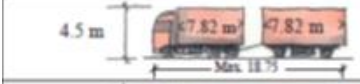




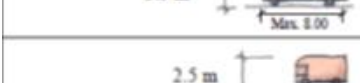




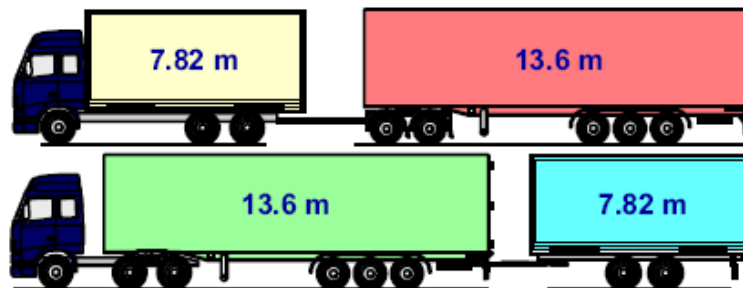
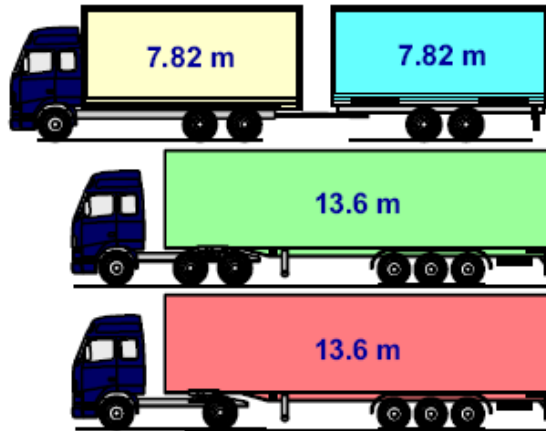
(c) International Road Transport Union (IRU) 2011



# How to choose the best goods reception arrangement



Illustration of vehicle	Vehicle type, designation <sup>1)</sup> Gross weight in tonnes <sup>2)</sup>	Vehicle length	Vehicle width <sup>3)</sup>	Vehicle height <sup>4)</sup>	Trailer platform height <sup>5)</sup>	Goods reception type	Vertical clearance <sup>6)</sup>	Loading dock height <sup>7)</sup>
	Road train approx. 60 tonnes	24.00–25.25	2.60	4.00–4.50	1.00–1.35	Bigger goods reception with hydraulic dock leveller	Vehicle's total height + 0.60 m <sup>8)</sup>	1.00–1.35
	Road train ≤ 40 tonnes	18.75	2.60	4.00–4.50	1.00–1.35	-	-	1.00–1.35
	Articulated vehicle ≤ 40 tonnes	16.50	2.60	4.00–4.50	1.00–1.35	-	-	1.00–1.35
	Motor vehicle ≤ 32 tonnes	8.00–12.00	2.60	3.60–4.50	1.00–1.35	-	-	1.00–1.35
	Motor vehicle ≤ 26 tonnes	8.00–12.00	2.60	3.60–4.50	1.00–1.35	-	-	1.00–1.35
	Motor vehicle ≤ 18 tonnes	8.00–12.00	2.60	3.60–4.50	1.00–1.35	-	-	1.00–1.35
	Motor vehicle (small truck)	6.00–8.00	2.20–2.60	3.10–3.50	approx. 0.70–	Smaller goods reception with hydraulic dock leveller/manual dock leveller	-	0.70–0.80
	Light motor vehicle (delivery van) ≤ 3.5 tonnes	approx. 5.00 m	approx. 1.95 m	approx. 2.50 m	approx. 0.40–0.60 m	Smaller goods reception with manual dock leveller	-	0.40–0.60
	Car, delivery van	approx. 5.00 m	approx. 1.60 m	approx. 1.80 m	approx. 0.40 m	Weather-tight loading and unloading station	2.50	0



## EU

40/44 tonnes  
18,75 metres

## EMS - European Modular System

25,25 metres

Sweden 1997

Finland

Nederlands

Norway 1 June 2008

Denmark 1 Nov 2008



## Intermodal transports

- Load carriers used in intermodal transports:
  - Trailer
  - Swap-body
  - ISO Containers

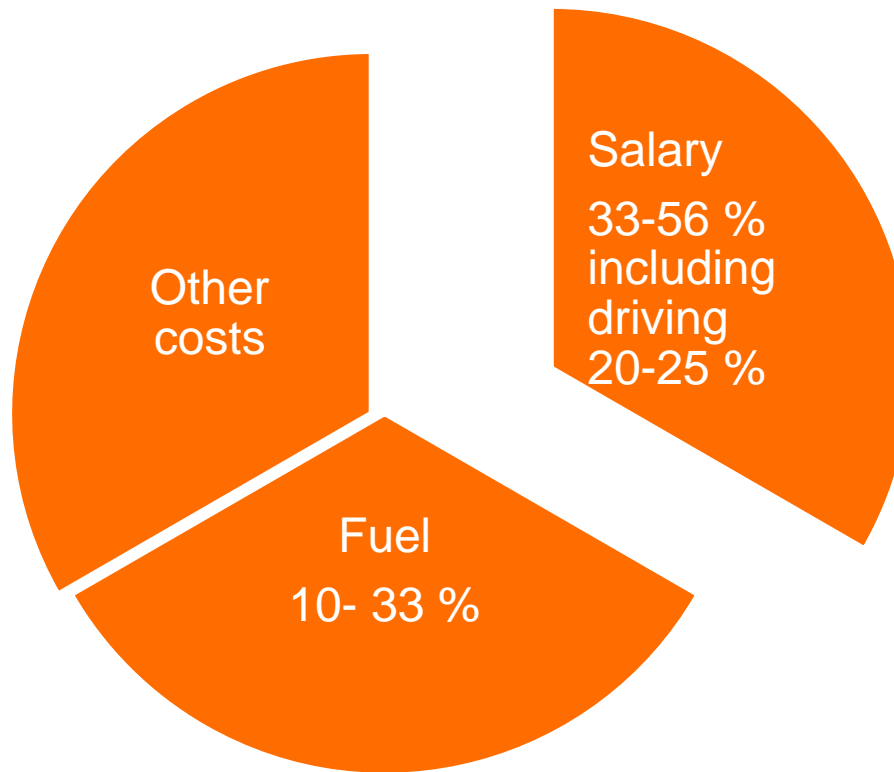








# TRANSPORT COSTS FOR ROAD FREIGHT



- ?  
CTU  
container  
swapbody  
semitrailer  
vehicle combination  
cargo  
loading  
cargo securing  
unloading  
documents  
communication  
customer service

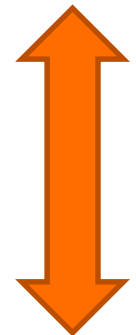


## CLIMAT SMART TRANSPORT

GVW tonnes	Vehicle or combination	Payload kg	Fuel litres/10 km	Index energy per tonneskm
74	Truck + trailer	53 000	5,3	100
64	Truck + trailer	45 000	4,5	100
40	Tractor + semitrailer	27 000	3,3	122
28	3-axle truck	19 000	2,8	147
18	2-axle truck	10 000	2,5	250
<3,5	Small truck	1 000	1,5	1.500
1,5	Car	(förare) 75	0,75	10.000
0,05	Autonomous small vehicle	10	0,1	10.000



Climat smart



Not climat smart



# CLIMAT SMART ROAD FREIGHT

>fossil free fuel

**GHG  
reduction**

30 %

20 %

10 %

Electric road

>HCT

Best solution

Fully automated  
vehicle

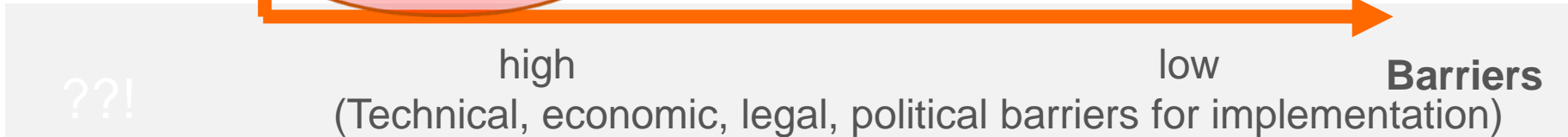
high

low

**Barriers**

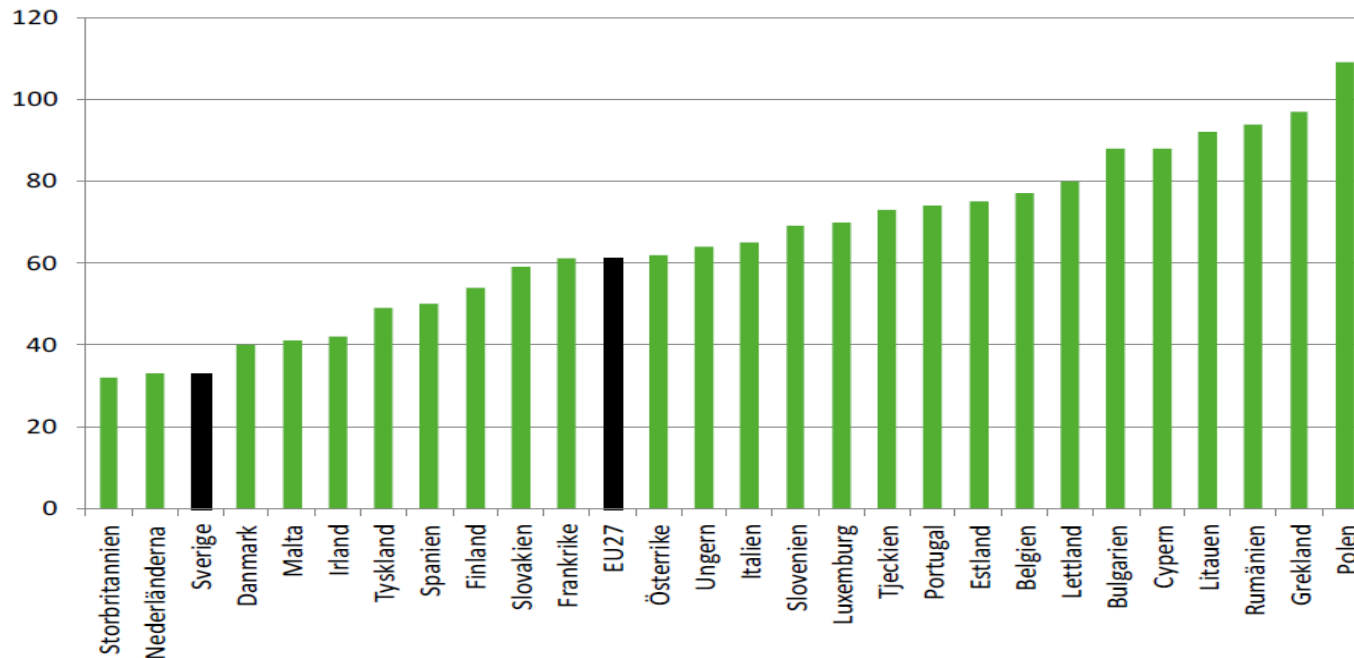
??!

(Technical, economic, legal, political barriers for implementation)





## FATALITIES IN ROAD TRAFFIC 2012 IN EU 27 PER 1.000.000 POPULATION



**Figur 1.5: Antal dödade i vägtrafikolyckor per miljon invånare i EU 27. År 2012.**

Källa: CARE (EU road accidents database) or national publications. European Commission / Directorate General Mobility and Transport (se föreliggande rapporter Bilaga 2, Tabell 7.2).



## Road traffic fatalities in Sweden

	2007	2010	2013	2014	2015	2016	2017
<b>Fatalities</b>	471	266	260	270	259	270	254
By HGV	92	46	31	49	39	40	31
In HGV	6	4	4	5	5	5	3
<b>Fatalities with HGV</b>	98	50	35	54	44	45	34
% HGV involved	21 %	19 %	13%	20%	17%	17%	13%
In on coming traffic	52	22	14	26	21	12	19
% fatalities in on coming traffic	53 %	44 %	40%	48%	48%	27%	56%
Fatalities per 100.000 population	4,8	2,7	2,7	2,8	2,7	2,8	2,7
Suicides		7	9	13	11	16	15

# Road Traffic Safety – A global issue

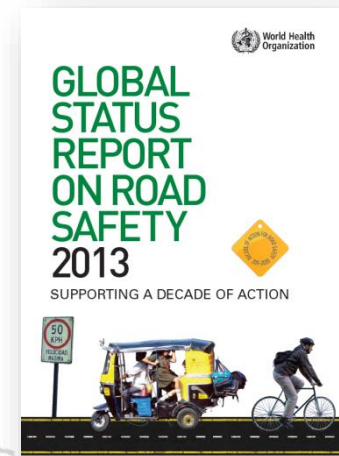


**1.24 million** road traffic deaths every year.

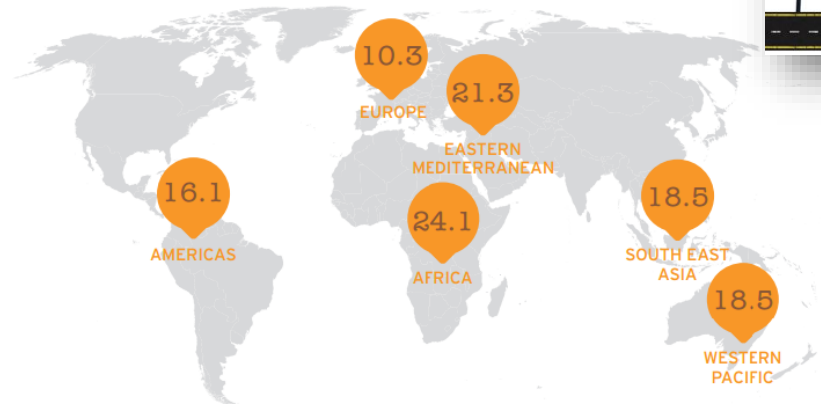
As many as **50 million** are injured each year.



**8th** leading cause of death globally



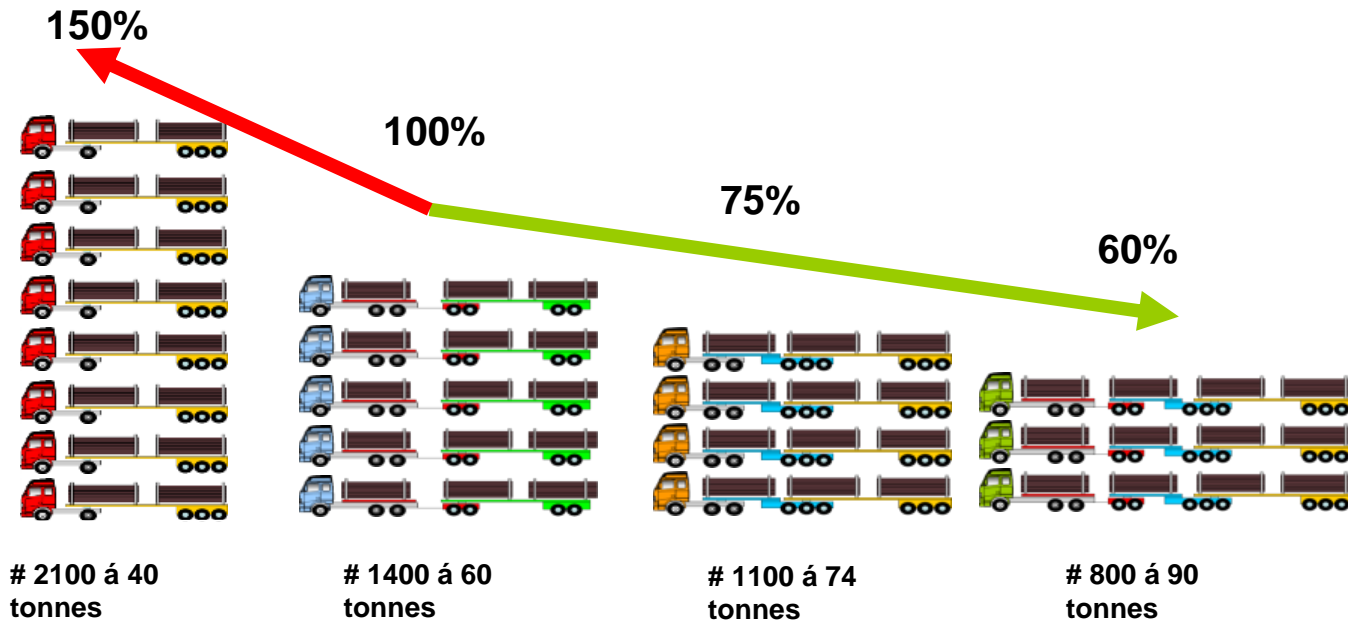
HOW SAFE YOU ARE DEPENDS ON WHERE YOU ARE:  
**ROAD FATALITIES PER 100,000 POPULATION**



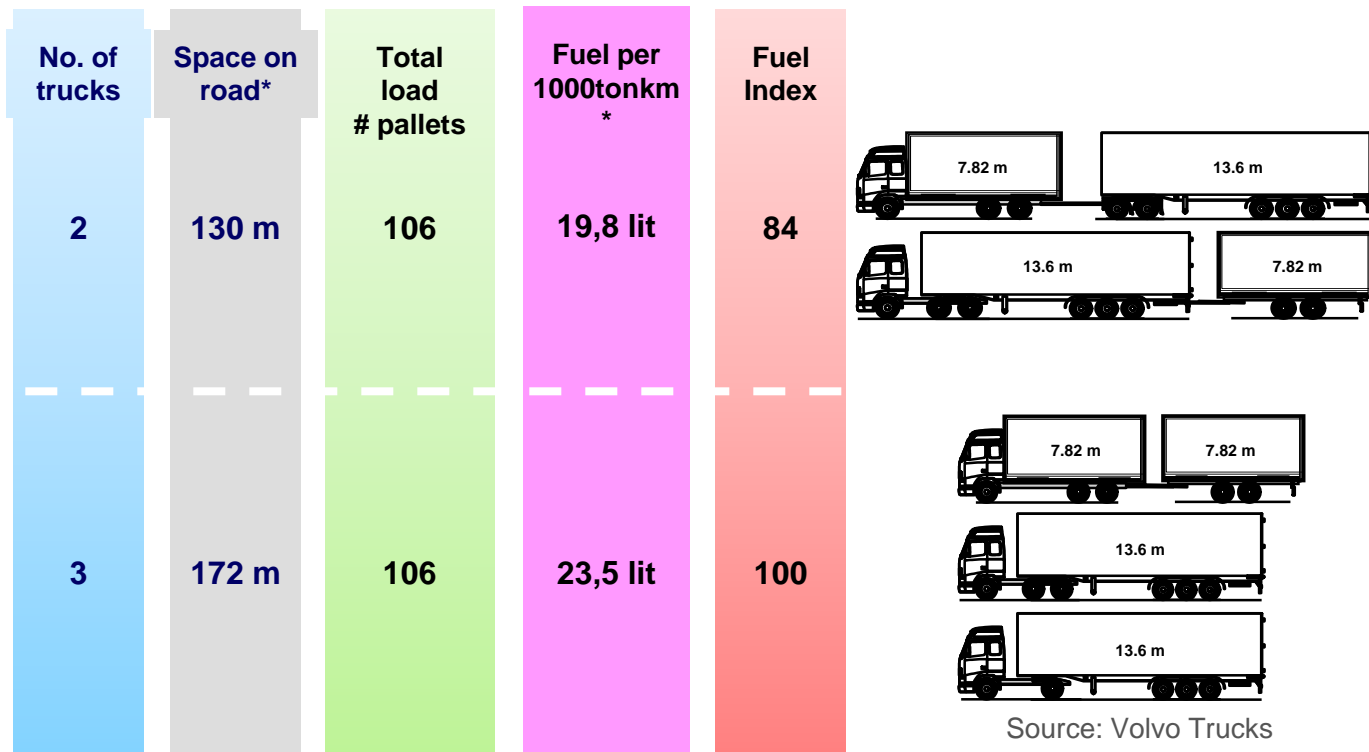
Global Road Safety Partnership Annual Report 2013

# Number of vehicles needed

60 Mtonnes cargo 92 km



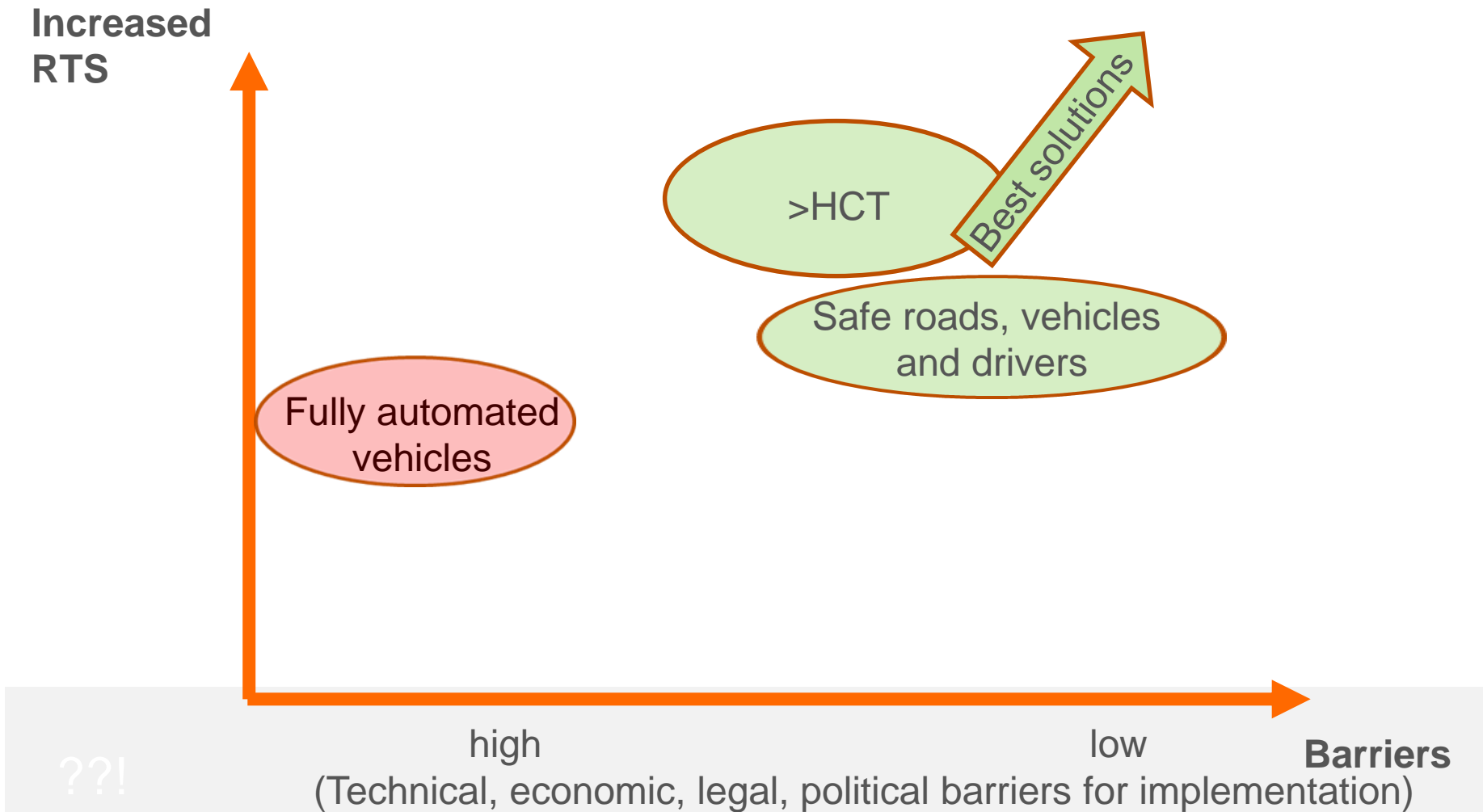
## Comparison 25.25 m vehicles to 18.75 / 16.5 m



\* Note: Calculated for load = 400 kg per pallet  
Safety distance 40 m per truck



# RTS- ROAD TRAFFIC SAFETY





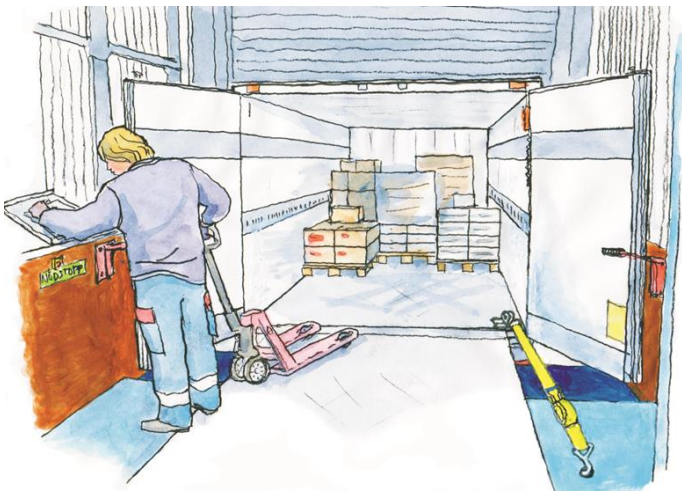
## BE AWARE THAT FULLY AUTOMATION IS NOT FEASIBLE



Photo: Axel Öberg



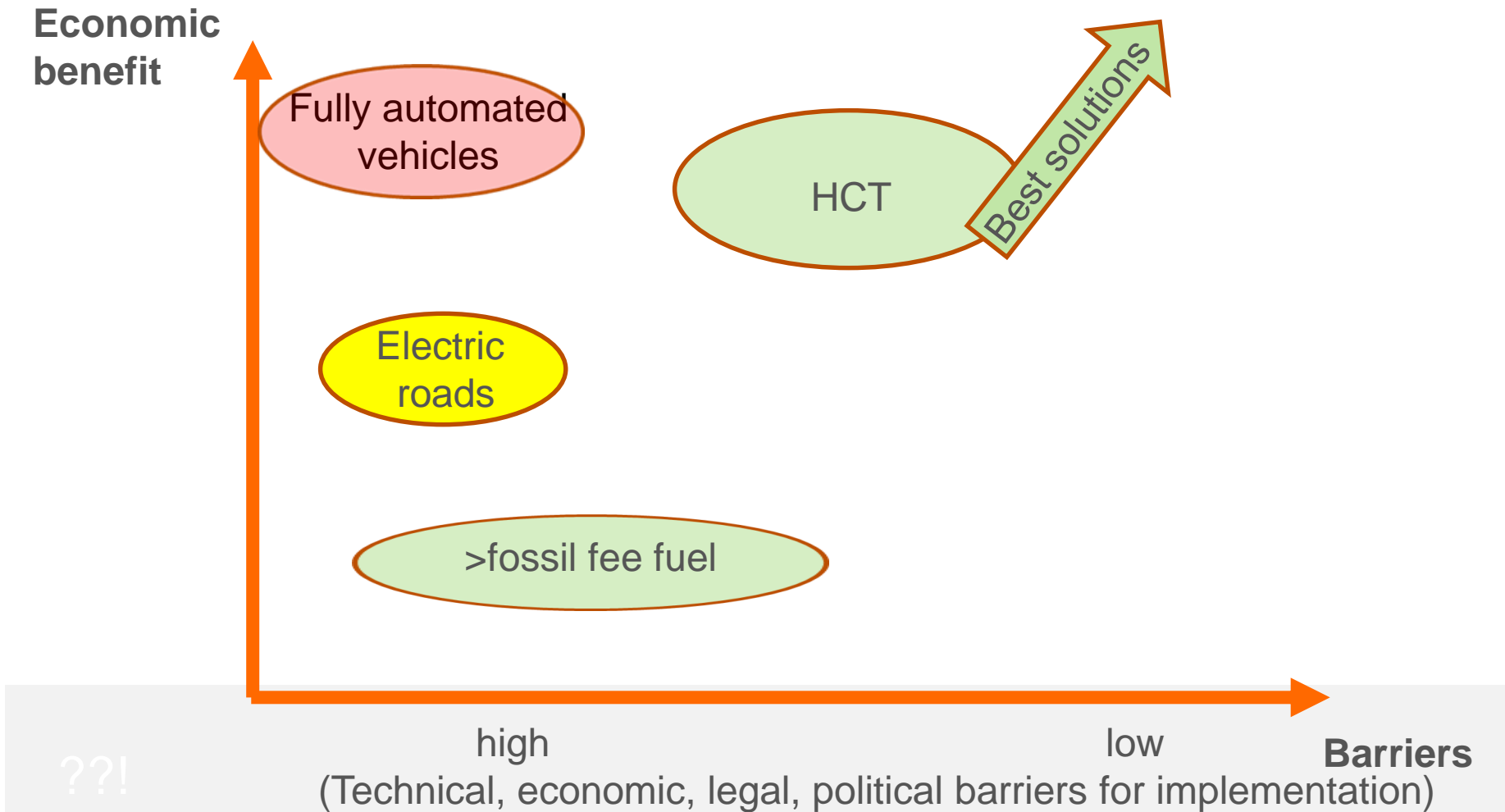
Törnkvist Åkeri AB



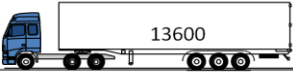




IRU International Guidelines on Safe Load Securing for Road Transport



# ECONOMIC ROAD FREIGHT



## Capacity comparison

	Gross-weight	Pay-load	Total vehicle length	Length of load area	Load capacity	
					volume (m <sup>3</sup> )	EUR-pallets (num.)
	(tonnes)		(metres)			
	40	27	16.5	13.2	90 (100)*	33 (33)*
	40 (44)**	25 (27)**	18.75	14.6	100	36
	60	40	25.25	20.5	140	51
	64 (60)	42 (38)	27	21.9	150	54
	80	56	32	26.4	180	66

## ADVICE ON FULLY AUTOMATED ROAD FREIGHT

- What is achieved? - in economy, road safety and climate?
- Handle barriers - lost eye contact, legal issues, accidents, navigation, ADR, property damage, cargo securing, animal collision, driving and rest times, education of other road users, mixed traffic, winter roads.
- Inefficient - platooning, small vehicles means congestions.
- More efficient road transport - HCT, fossil free fuel, logistics, robustness, winter road, flexibility.
- Security –antagonists, hackers, power off, defense policy.
- Step by step, not all but some road freight will be fully automated

# THANK YOU!

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