



# **SUSTAINABLE TRANSPORT- FOCUS ON RAILWAYS**

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**1. ASPECTS OF SUSTAINABLE  
TRANSPORT IN EU**



**2. RAILWAYS SUSTAINABILITY ISSUES  
IN THE CZECH REPUBLIC - INTL.  
COMPARISONS**



**3. COMMENTS ON SUSTAINABILITY OF  
SWISS RAILWAYS - NEAT**

# **SUSTAINABLE TRANSPORT IN EU- GOALS & TRENDS**

- **Goals in EU transportation sector:**
  - **Sustainability**
  - **Energy-efficiency**
  - **Compatible with environmental requirements**
- **Trends in the transport sector in EU:**
  - **Growing personal and freight transport**
  - **Growing emission risks**
  - **Transport slow-down (road traffic jams)**



# EU: TRANSPORT POLICY

## “White Paper” on European transport policy (2010)

- Importance of international transport links
- Integration of long-distance connections with “door-to-door” links
- **Sustainable transport**
  - Promotion of alternative transport systems – intermodal chain-modal shift
    - **Railways**
    - **City public transport**
    - Water ways
  - Interlink of flexibility, versatility and transport speed
  - Financial support of environmentally friendly infrastructure (i.e., railway tunnels)



# EU: TRANSPORT OUTLOOK

- **Development of the EU transport sector:**
  - **Increase by 40%** between 2013/2035
  - **Highly desirable simultaneous emission reduction (EU climate targets)**

# EU SUSTAINABLE TRANSPORT- MAJOR DEVELOPMENT DIRECTIONS

- **Promotion and support of modal splits**
  - **Gradual move to optimal combination and interlink of various transport systems within transport chains**
- **Technical innovations (transport technology, communication, safety)**
- **Shift to lowest emissions**
- **Most energy efficient transport modes**

# EU SUSTAINABLE TRANSPORT- MAJOR DEVELOPMENT DIRECTIONS

- Gradual shift of 50% of road freight to railways and water ways on medium and long distances
- In personal transport substantially increase share of railways transport
- Shift from air transport within 1000 km to railways (allowing air space for more long-haul air transport)
- Introduction of more efficient driving technologies

# EU SUSTAINABLE TRANSPORT-RAILWAYS

## EU program of railways revitalization.

- Acceptance of the program to revitalize railway freight transport

- Increase in transport capacity of railways (national, regional, trans-European transport network)
- Enabling transloading of containers from the road to railway transport
- Interlinking local and regional freight railway transport and the long-distance transport
- Requirement to introduce "Transport management plans"



# High speed rail

Fast track to sustainable mobility



UNION INTERNATIONALE DES CHEMINS DE FER

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[www.uic.asso.fr/gw/](http://www.uic.asso.fr/gw/)  
January 2009 - 2



Union Internationale des Chemins de fer

# High speed rail and the environment



## Land use

Due to high speed rail's very high transport capacity, the land needed for the large traffic volumes carried is significantly reduced.

### As an example, some land use ratios:

- Average high speed lines 3.2 ha / km
- Average motorways 9.3 ha / km

In addition, the impact on land use can be significantly reduced if the layout of new high speed lines is parallel to existing motorways (where layout parameters permit).

### Examples of the increased use of parallel layouts in recent years

- Paris-Lyons (1981-1983) 60 km (14 %)
- Paris-Lille (1993) 135 km (41 %)
- Cologne-Frankfurt (2002) 140 km (71 %)

The construction of a new high speed line is sometimes a good opportunity to upgrade and renovate spaces and landscapes.

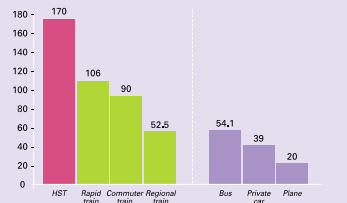


### Comparisons in land use

HS Railway	Motorway
Double track 25 m	2x3 lanes 75 m
2x12 trains per hour	2x4,500 cars per hour
2x666 passengers / train capacity	2x1,7 passengers / car capacity
2x8,000 passengers / hour	2x7,650 passengers / hour

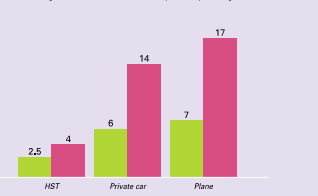
### Energy Efficiency - Passenger

Passenger-kilometres carried per unit of energy (1kwh = 0.086 kcp)



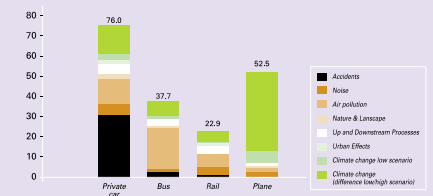
### Primary Energy and CO2 Emission

Green: litres of petrol per 100 passenger-kilometres  
Red: kilograms of CO2 emissions per 100 passenger-kilometres



### Average External Costs

(Euros per 1,000 passengers-kilometres)





# High speed around the world



## Systems in operation

- Belgium
- France
- Germany
- Italy
- Spain
- United Kingdom
- China - Taiwan
- Japan
- Korea
- USA



Europe 2008



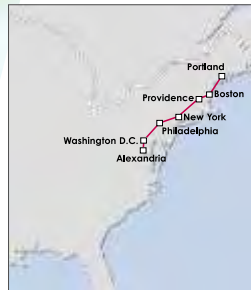
Europe 2025



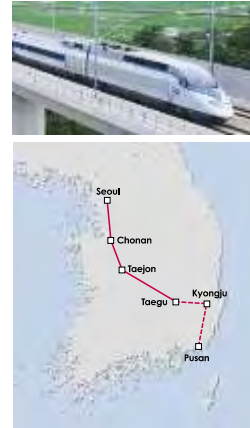
China



Taiwan



USA



Korea



Japan

- High speed in operation
- - - High speed line in development phase
- Upgraded conventional lines

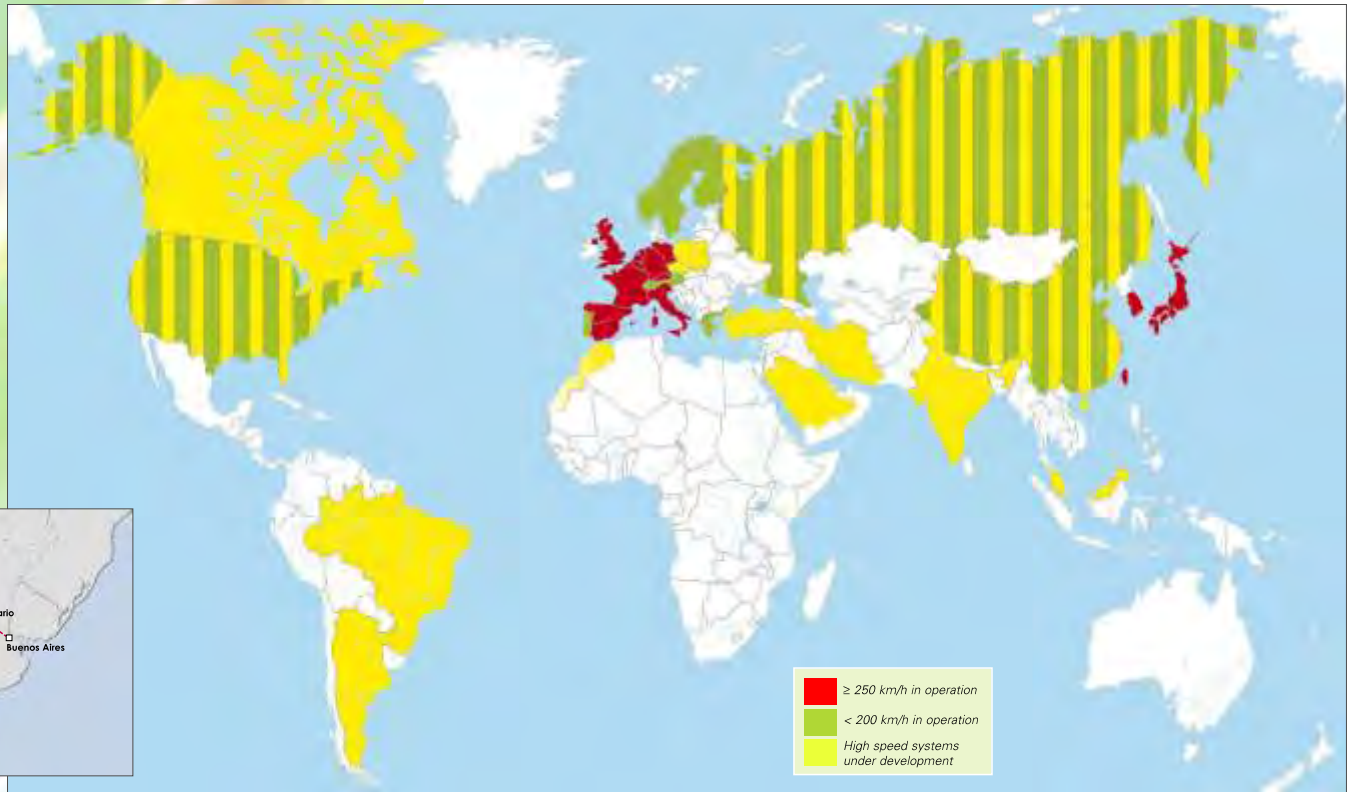
# High speed around the world

## Systems under construction

- China
- Iran
- The Netherlands
- Turkey

## Systems under development

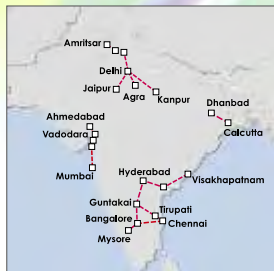
- Argentina
- Brazil
- India
- Morocco
- Poland
- Portugal
- Russia
- Saudi Arabia



Argentina



Brazil



India



Iran



Saudi Arabia



Morocco




China



Turkey

A decorative graphic on the left side of the slide features three balloons: a green one at the top, a light blue one in the middle, and a purple one at the bottom. Each balloon is attached to a streamer and has several small yellow triangular shapes around it, resembling confetti or streamer ends.

## **2. RAILWAYS SUSTAINABILITY ISSUES IN THE CZECH REPUBLIC - INTL. COMPARISONS**



# **CZECH REPUBLIC(CR): TRANSPORT POLICY 2014-2020- (2050)**

**Draft proposal prepared by the Ministry of Transport**

- **Transport sector:**

- **Infrastructural prerequisite for coping with the Govt.'s high priority regarding increase of country's competitiveness**

- **Transport policy: compatible with the EU "White Book"**

- **Focus on the following factors/areas:**

- **Safety**
- **Sustainable development (country, sector)**
- **Economy**
- **Environmental protection**
- **Public health**

# CR: BRIEF DIAGNOSES OF CURRENT RAILWAY SYSTEM

- Share of the railway transport in the country's transport is **comparable** with E-15
- Nevertheless, the **difference** lies in trends:
  - EU- growing share of railway transport
  - CR- decreasing trend in favor of the road transport
- **Gap in technological equipment**
  - EU: multi-modal transport systems
  - CR: classical technology delivery
- **Lack of terminals for multi-modal transport systems**
- **Need for linkages of logistic centers from the road to railway transport**
- **Need for high quality infrastructure** as precondition for railway transport
- **Financial capacity**



# CO-2 EMISSION PROFILES BY SECTORS: ČR, CH a EU (2010)

	EU	ČR	Switzerl.
<b>Celkové Emise</b> mil. t CO2 %	3659 100	114 100	44 100
<b>Výroba el.+ teplo</b> mil. t CO2 %	1340 38	63 56	3 7
<b>Průmysl</b> mil. t CO2 %	546 15	21 18	6 15
<b>Doprava</b> mil. t CO2 %	900 26	17 15	17 39
<b>Ostatní</b> mil. t CO2 %	773 21	13 11	17 39



# INDICATORS OF SUSTAINABLE TRANSPORT: CZECH REPUBLIC AND SWITZERLAND

ASPECTS	Indicators	ČR	Switzerland	
<b>Techno-economic</b>	Speed	0	2/3	
	Reliability	0	3	
	Safety	1	3	
	Technical level	0/1	3	
	Energy intensity	0/1	2	
	Costs	1	2	
<b>Environmental</b>	Emissions	Local (NOx, PM10, PM2,5)	0	2
		Global	1	2
	Noise		0	2
<b>Social</b>	Level of access		3	2
	Punctuality		0/1	3
	Affordability		1	2
	Travelling culture	Cleaness, services	-1/0	3

*Explanation:* -1: Improvement needed, 0: Acceptable, 1: Good, 2: Quality  
3: Excellent



# **3. INTERNATIONAL COMPARISONS OF RAILWAY INDICATORS**

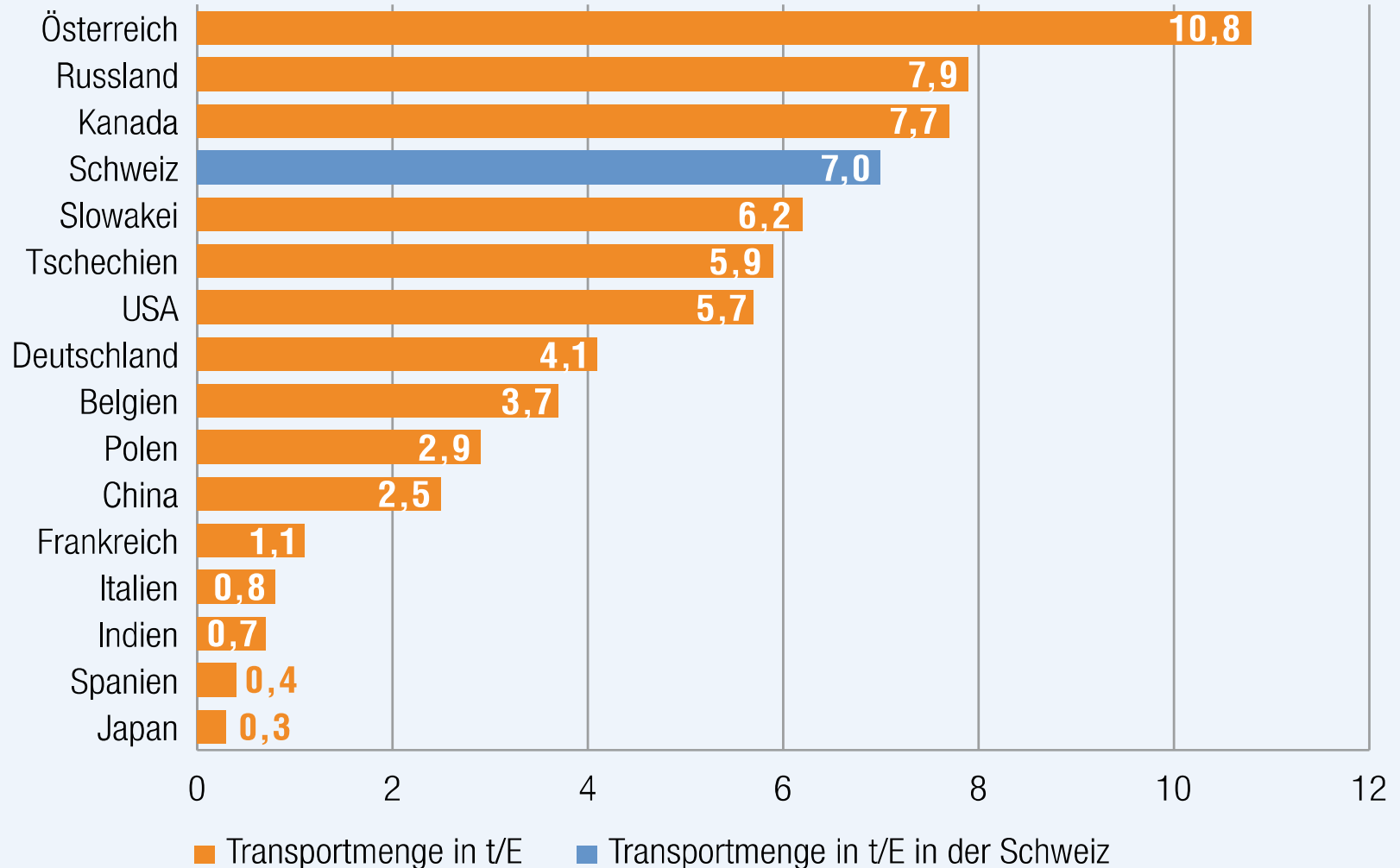


# TRANSPORT CAPACITY

<b>COUNTRY</b>	<b>Personal transport</b>	<b>Freight</b>
	(km/cap)	(t/cap)
<b>ČR</b>	<b>647</b>	<b>5,9</b>
<b>Switzerland</b>	<b>2196</b>	<b>7,0</b>
<b>Germany</b>	988	4,1
<b>France</b>	1354	1,1
<b>Great Britain</b>	854	1,6
<b>Italy</b>	758	0,7

# CAPACITY OF FREIGHT RAILWAYS (t/cap)

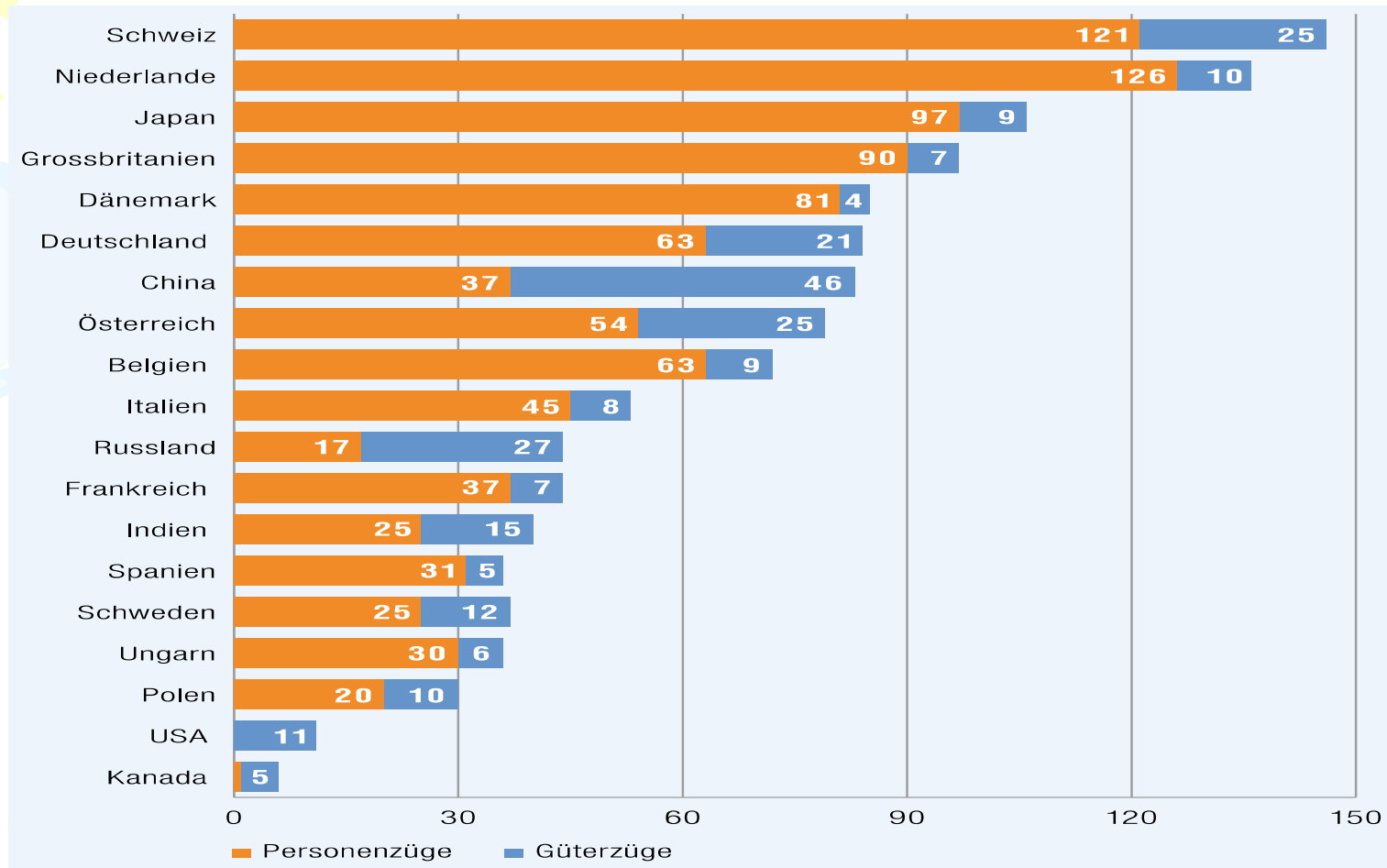
Binnen-Schienengüterverkehr 2009 in Tonnen pro Einwohner



# DENSITY OF INTL. RAILWAYS

(number of daily trains per km)

Anzahl Züge pro Kilometer und Tag auf den Bahnnetzen 2010

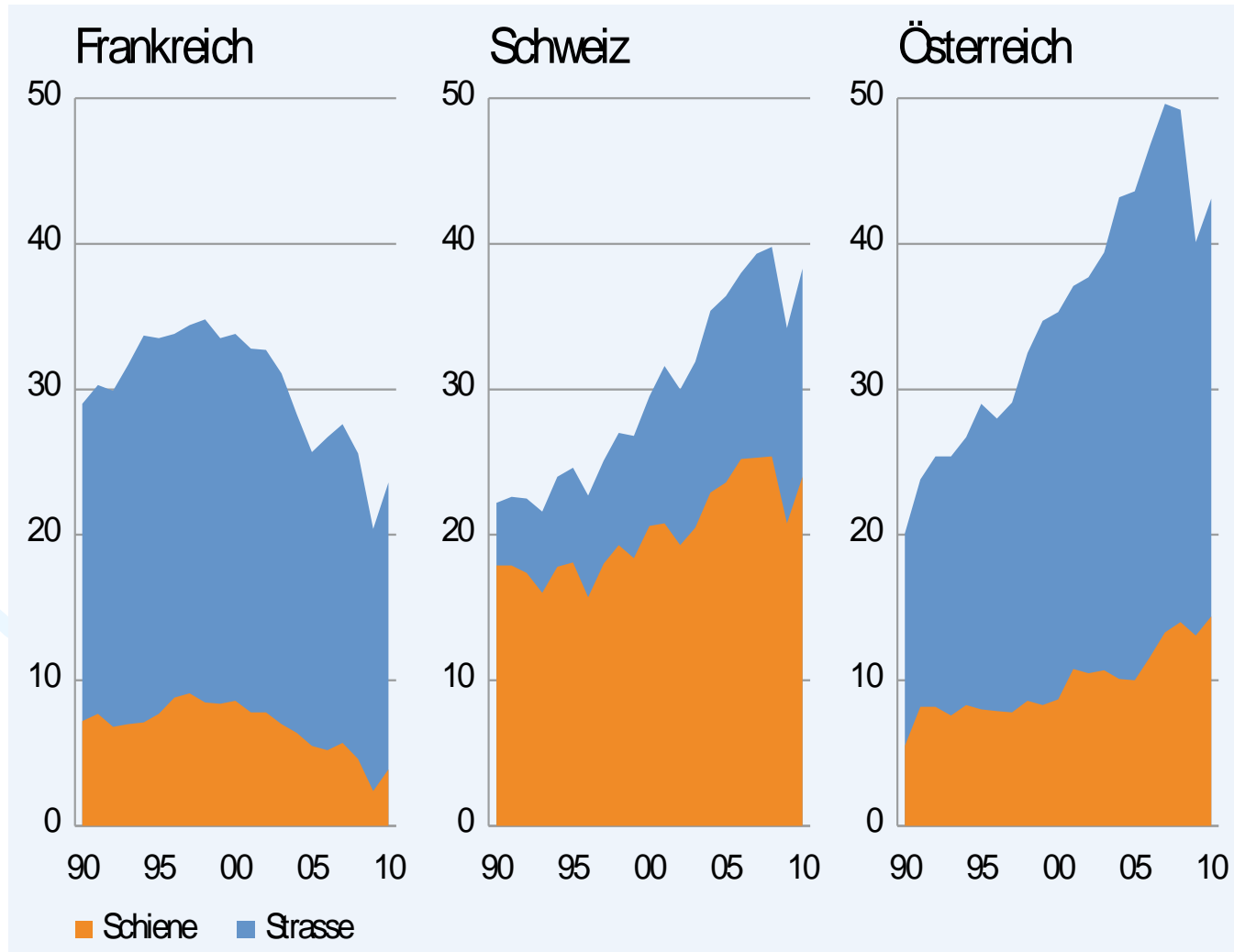


Three balloons are positioned on the left side of the slide. The top one is light green, the middle one is light blue, and the bottom one is light purple. Each balloon has a string and several small yellow triangular shapes radiating from it, suggesting movement or light.

### **3. COMMENTS ON SUSTAINABILITY OF SWISS RAILWAYS - NEAT**

# INTL. FREIGHT MODAL-SPLITS THROUGH ALPS

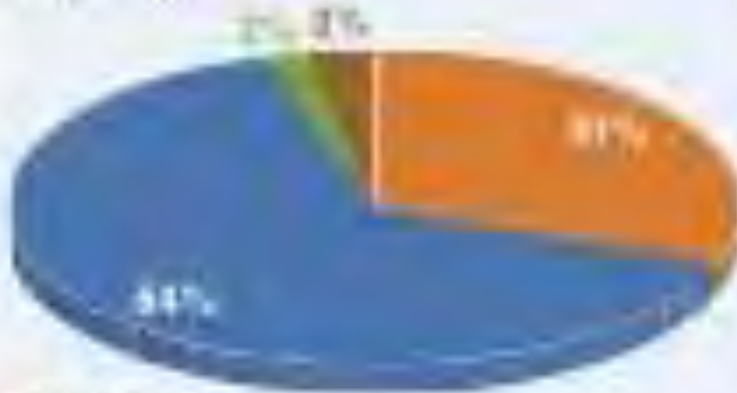
Modalsplit im alpenquerenden Güterverkehr in Millionen Tonnen



# MAJOR FREIGHT TUNNEL LINKS North-South

Marktanteile im alpenquerenden Güterverkehr

Gotthard



- BLS Cargo
- SEB Cargo
- Control
- Rail4U.com, IX Logistics

Lötschberg-Simplon

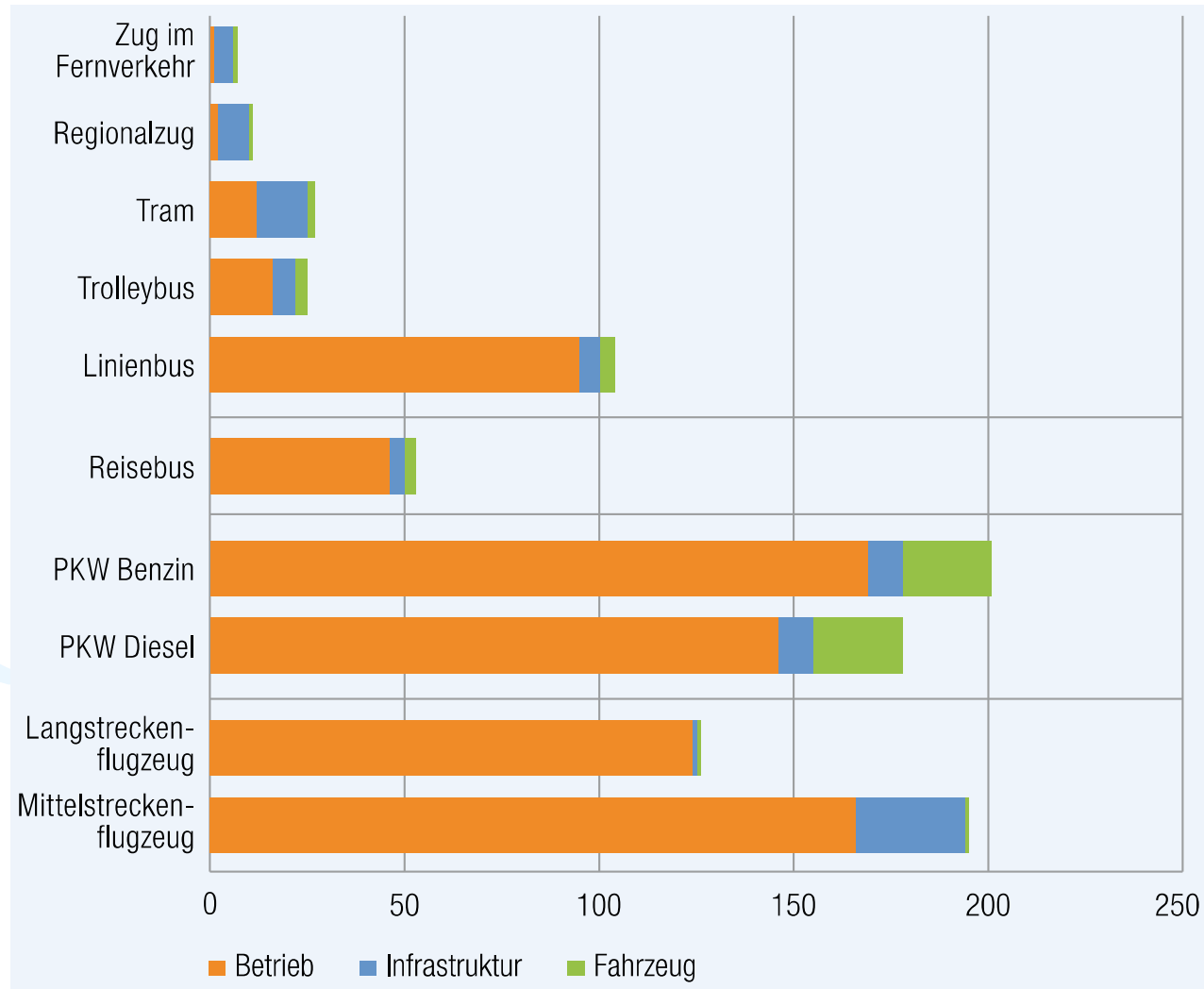


- BLS Cargo
- SEB Cargo
- Control



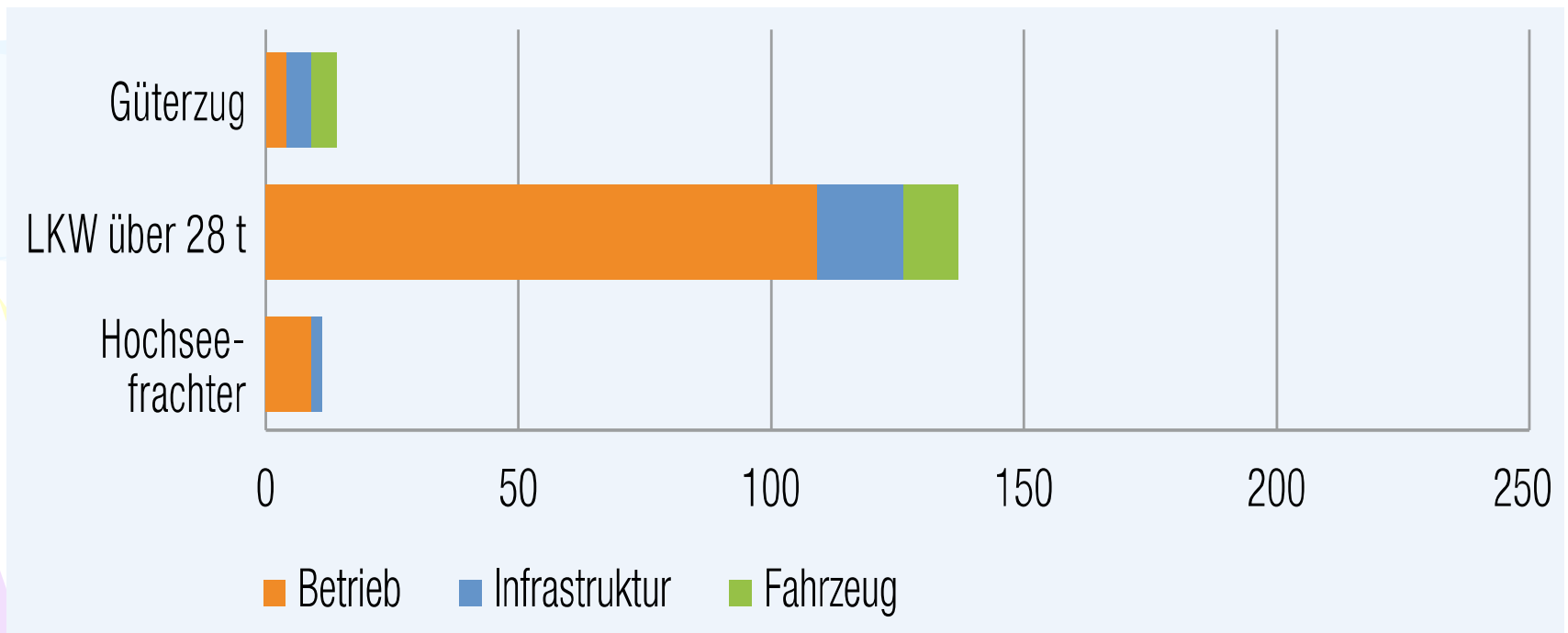
# CO<sub>2</sub>-EMISSION INTENSITY OF SWISS PERSONAL TRANSPORT SYSTEMS

CO<sub>2</sub>-Intensität des Personenverkehrs, in g CO<sub>2</sub>/Pkm



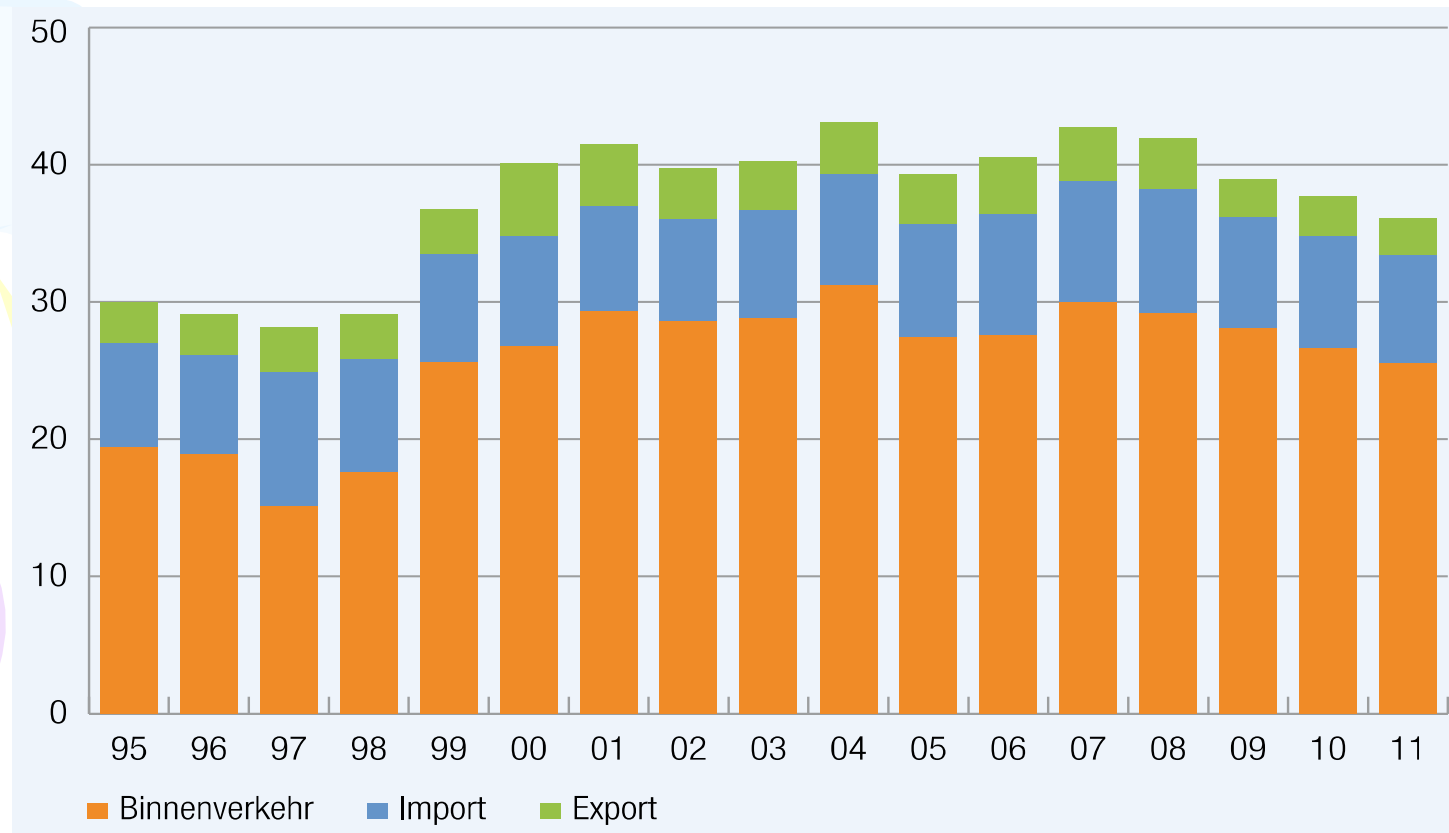
# CO<sub>2</sub>-EMISSION INTENSITY OF SWISS FREIGHT SYSTEMS

CO<sub>2</sub>-Intensität des Güterverkehrs, in g CO<sub>2</sub>/Pkm



# DEVELOPMENT OF SWISS RAILWAY: ANNUAL SAVING OF 2,5 MILLION TRUCKS (ROAD to RAILWAY)

Entwicklung des Binnen-, Import- und Exportverkehr auf der Schiene  
in Millionen Netto-Tonnen





# NEAT TUNNEL SUSTAINABILITY PROFILE

## Transport sustainability indicators:

### (i) Techno-economic:

- Modal-split (road-railways-road)
- > Transport flexibility
- > Transport safety
- > Speed
- Cost-effectiveness (??): investment vis-à-vis O&M → long-term B/C

### (ii) Environmental:

- << Emissions: local (NO<sub>x</sub>, dust, PM 10, PM 2,5)  
global (savings in transport fuel)
- < Noise

### (iii) Social:

- > road safety
- > temporary employment



**THANK YOU FOR YOUR ATTENTION**

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