

Environmental Performance of a Transport Service Provider

M. Bösch, Dr. sc. ETH
SBB Sustainability

31.3.2015, LCA DF 58, ETH Zurich



Content.

1. Swiss Federal Railways (SBB) and Rail Traffic in Switzerland
2. Drivers for GHG reporting
3. Relevant environmental targets
4. System boundaries
5. Current and planned GHG reporting / KPIs

Total income

- 8,169 billion CHF per year

Procurement

- 4.732 billion CHF per year

Employment

- FTE: 29,240
- Female: 15.8%

Locomotives

- Passenger: 603
- Cargo: 544
- Infrastructure: 269

In total, about 353 million people travel with SBB every year; every **Swiss resident** uses rail **50 times a year** (EU 27: 15 times)

Rail travel in 2010 totalled **17.5 billion passenger km** a rise of about 50% since 2000 (EU 27: +10% since 2000)

On average, 149.7 trains per line travel on the Swiss rail network each day (EU 27: 45 trains).
In other words: **8,000 trains** run on the network **each day**

SBB transports 480,000 items of baggage every year; stretched out in a line, they would reach from Berne to Venice.

SBB Real Estate

- 3,500 properties
- 808 stations
- 32,433 rental contracts

SBB Passenger Services

- 967,000 passengers/day
- 354m passengers/year
- Avg. load factor: 29.5%

SBB Cargo

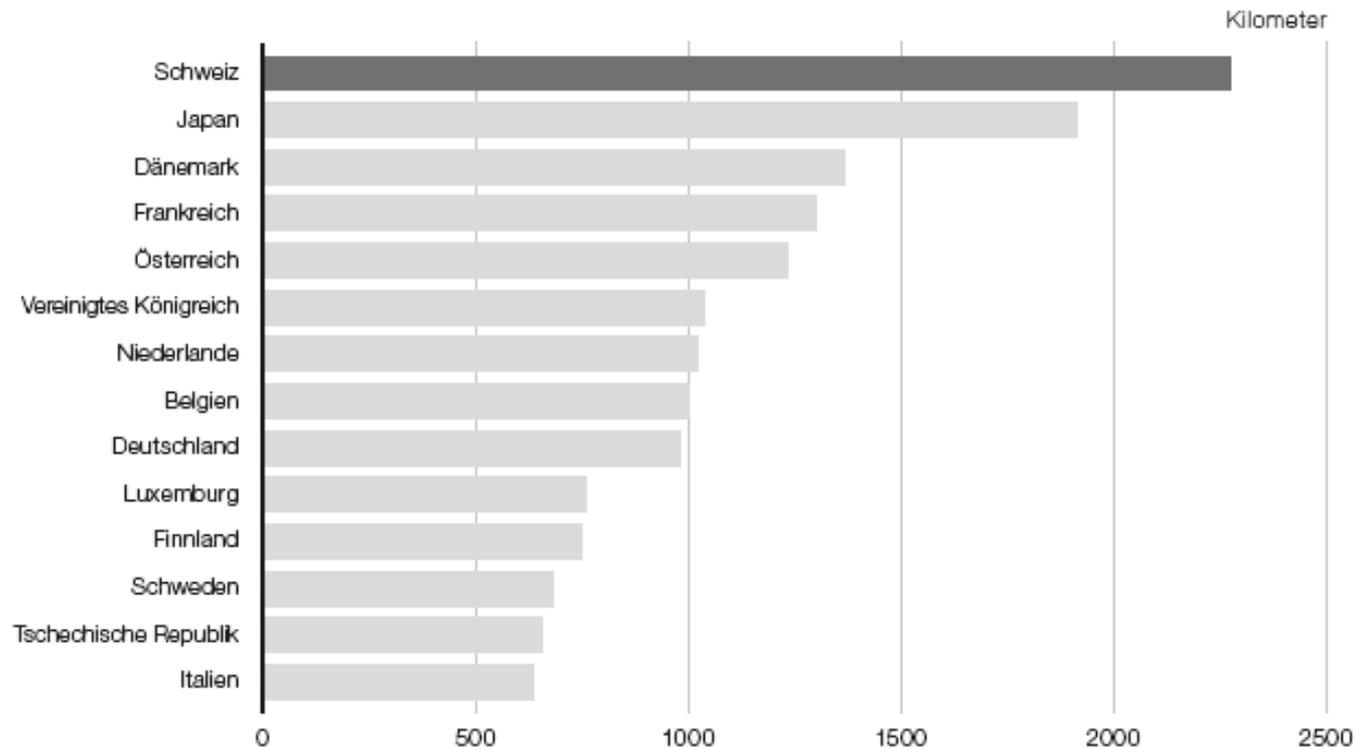
- 175,000 net-t/day
- 3500 customers
- 323 access points

SBB Infrastructure

- Normal gauge network: 3,040 km
- Hydroelectric plants: 6
- 303 tunnels

Train-kilometers per inhabitant / year.

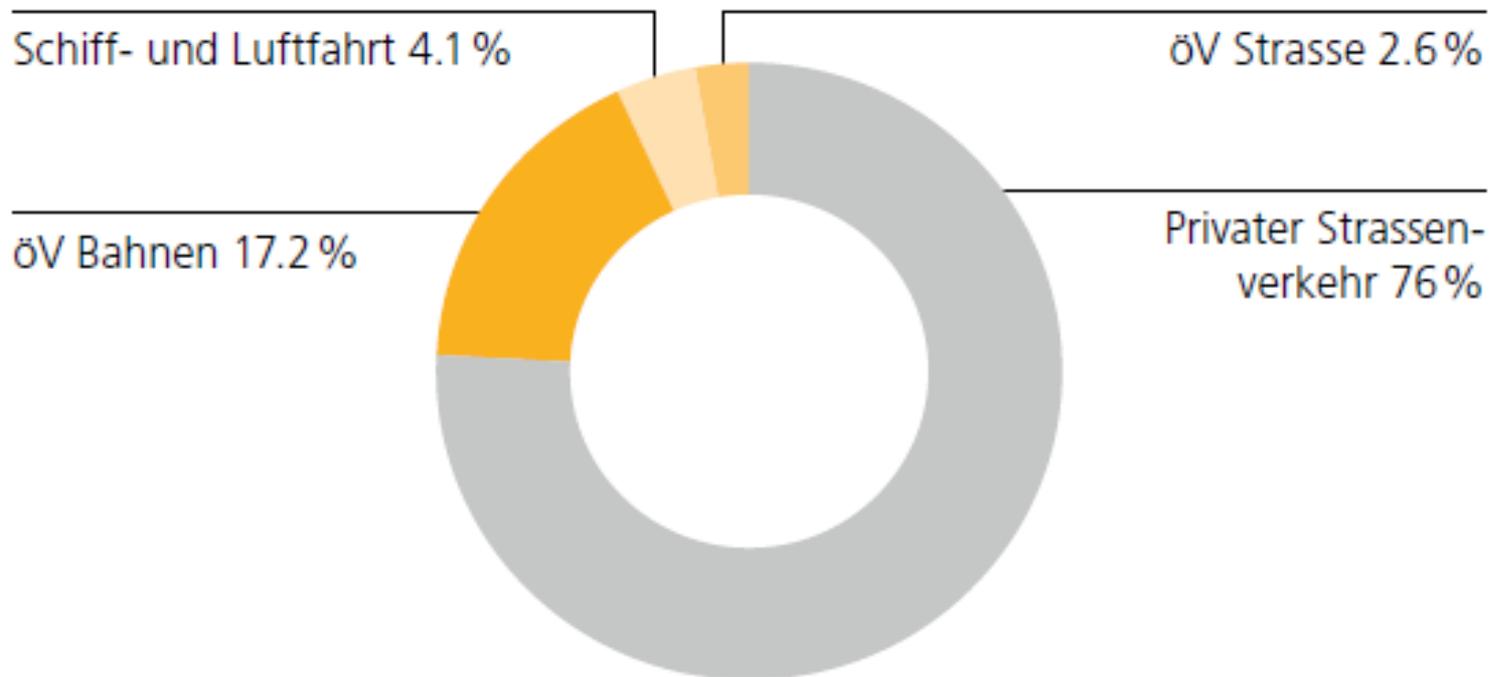
Bahnkilometer pro Einwohner im Jahr 2012.



Quelle: UIC-Synopsis 2012.

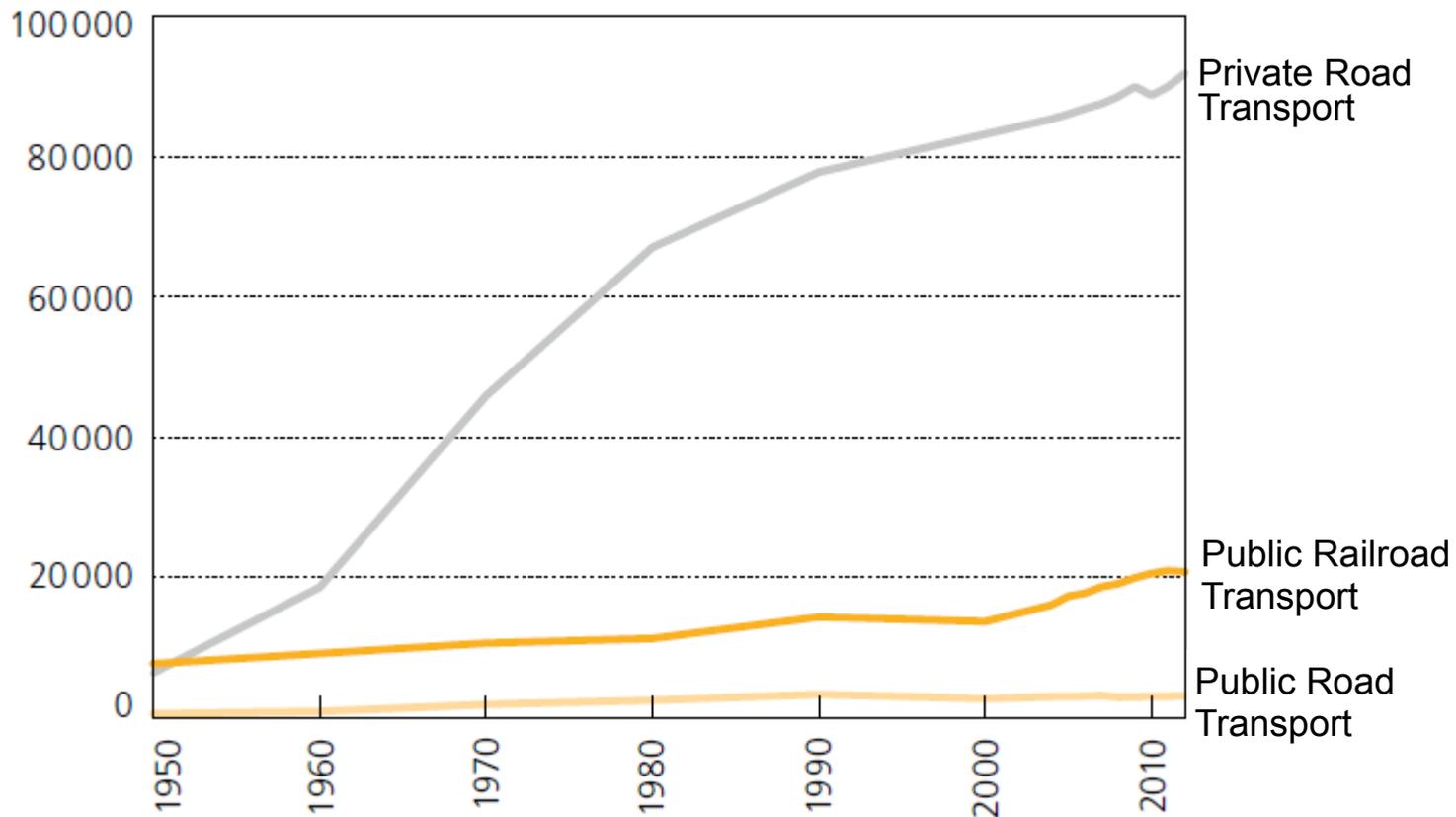
Passenger traffic in Switzerland. Share of modes.

Personenkilometer pro Verkehrsträger 2012
in % des Gesamtverkehrs



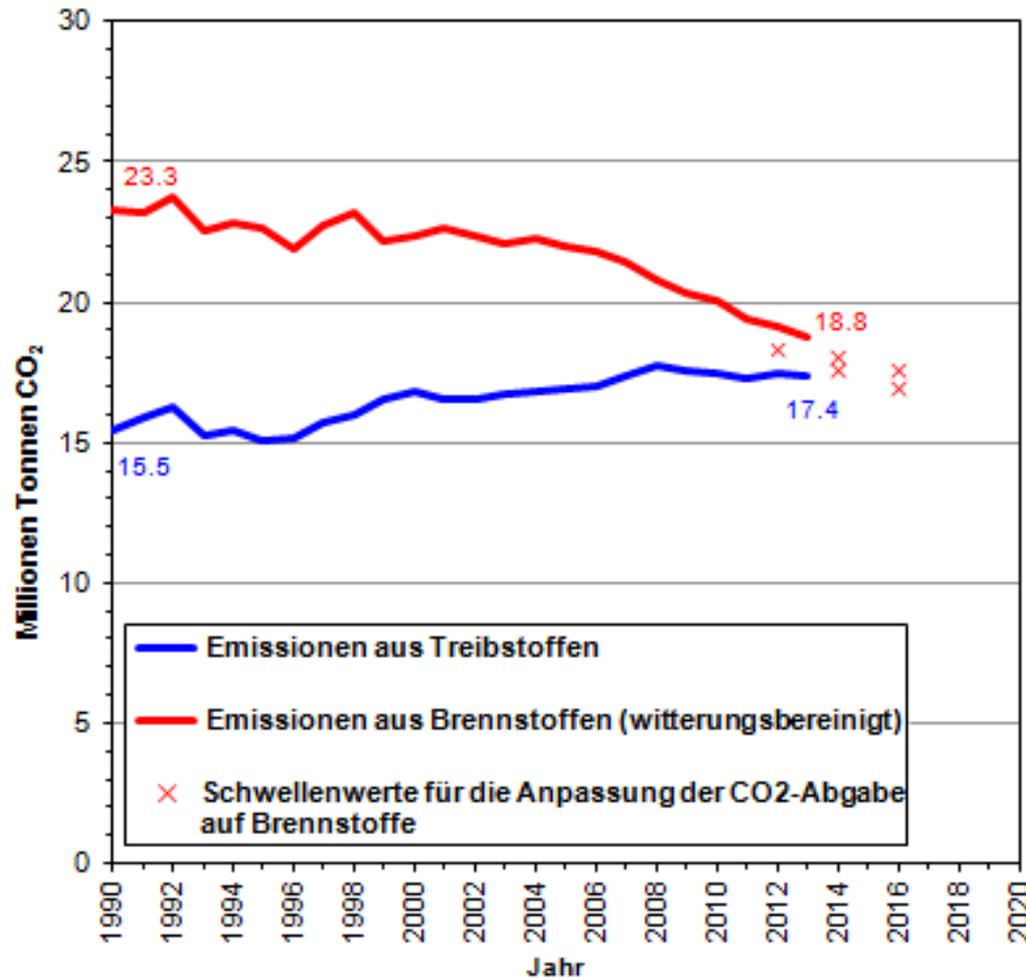
Passenger traffic in Switzerland. Development 1950 - 2012

Personenkilometer pro Verkehrsträger 1950–2012
in Mio. Pkm



Modal shift.

Transport-generated emissions are increasing.



Corporate greenhouse gas reporting (total emissions in t CO₂e)

- SBB environmental policy, env. management (ISO 14001)
- Owner targets (Swiss climate policy, targets for SBB)
- Sustainability reporting / communication (SBB sustainability report / GRI, Zahlen&Fakten etc.)

Performance KPIs (specific emissions in g CO₂e per pkm, tkm)

- Product information for passengers / customers
- Demonstrate env. advantage of rail transport versus road
- Ensure environmental advantage of modal shift
- European targets for rail transport (UIC/CER)

Drivers for GHG reporting and KPIs

Absolute energy use and GHG emissions

- SBB: By 2025, SBB will save **600 GWh** of energy
- SBB: By 2020, SBB will **reduce absolute CO₂-Emissions by 30%** until 2020 compared to base year 1990
- SBB: By 2025, **100% renewable energy for traction electricity**: by 2019, **100% renewable energy for 50Hz electricity**
- UIC/CER: By 2030 the European railways will not exceed the total CO₂ emission level from train operation in absolute terms (...) compared to 1990

Specific energy use and GHG emissions

- UIC/CER: By 2030 the European railways will reduce their specific final energy consumption from train operation by **30%** compared to the base year 1990
- UIC/CER: By 2020 the European railways will reduce their specific average CO₂ emissions from train operation by **30%** compared to base year 1990

Relevant environmental targets

Household electricity 50 Hz



235 GWh*

Corresponds to the electricity use of 60'000 households

→ SBB purchases electricity from the national grid.

- About 700 electricity suppliers in Switzerland
- Price regulation by ElCom.
- Step-by-step deregulation of Swiss electricity market.

Traction electricity 16.7 Hz



2'442 GWh*

Corresponds to the electricity use of 630'000 Hh
~90% from 6 SBB-owned hydropower plants

~10% powerplant participation

→ Virtually CO₂-free

- One sole supplier for SBB & 13 private railways
- Non-discriminating supply of infrastructure operators
- Price regulated by Federal Office of Transport

Two types of electricity.

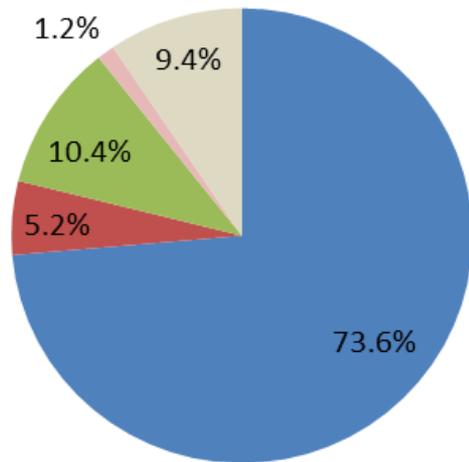
* Basis 2013

Source: SBB, 2011

Type	Product	Scopes
Absolute GHG emissions	Climate target	Energy-related direct & indirect GHG emissions
	SBB sustainability report / GRI	Energy-related direct & indirect GHG emissions
	Sustainability report GRI (planned from 2015)	GRI / ISO 14064
Specific GHG emissions	Environmental performance of rail transport (vs. road, air, water)	LCA
		DIN EN 16258 Tank-to-wheel
		DIN EN 16258 Tank-to-wheel

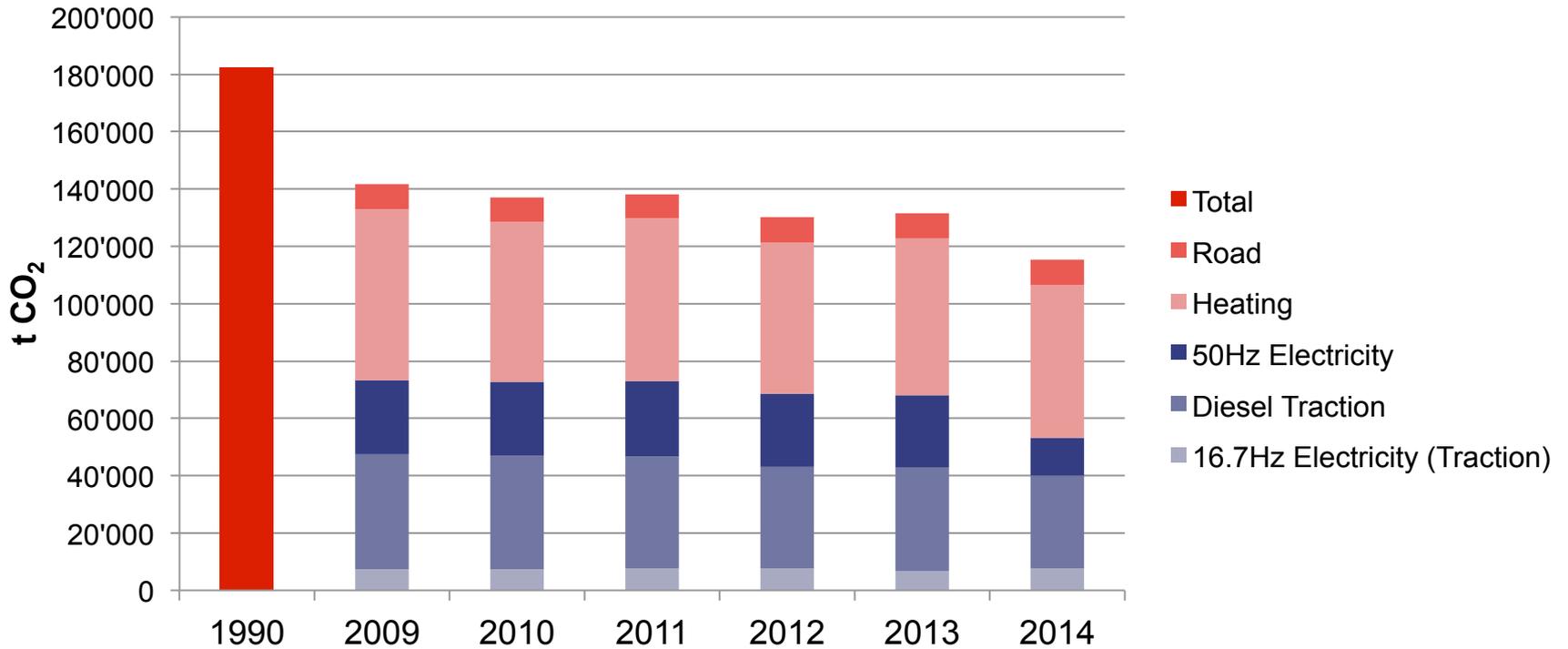
System boundaries

Energy use

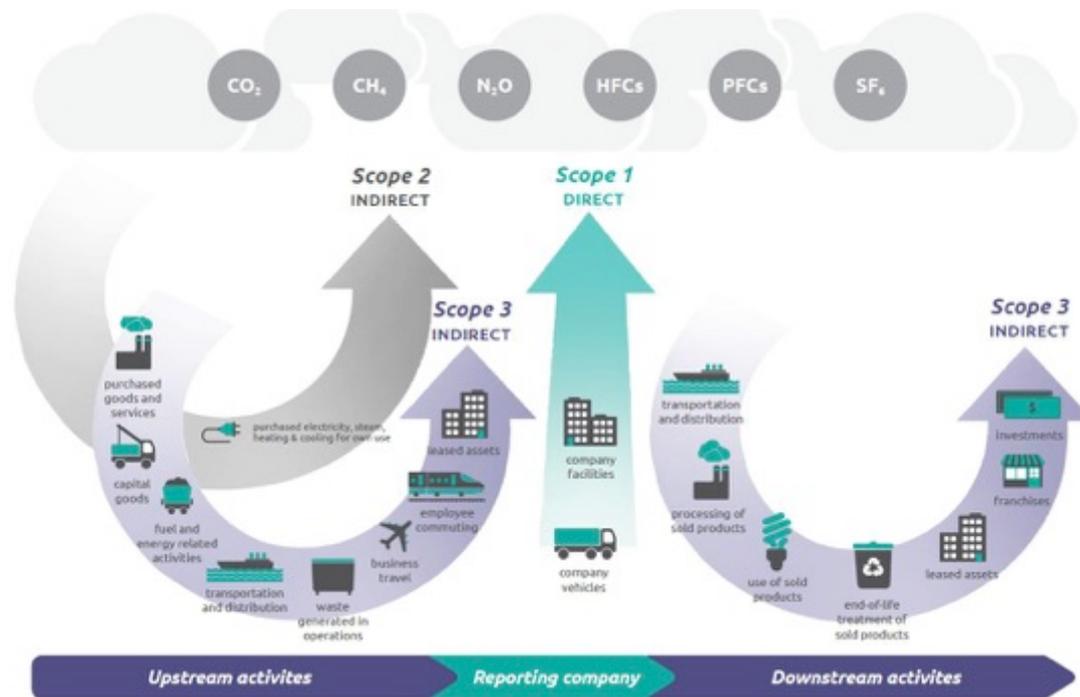


- Traction-Electricity 16.7Hz
- Traction-Diesel fuel
- Electricity 50Hz
- Road vehicles
- Heating

Current system boundaries: energy consumption at SBB AG.



Energy-related GHG emissions 1990 – 2014 (Scope 1-3)



- Organisational
 - SBB Corporate and Divisions (P, G, I, IM)
 - Subsidiaries
 - Contractors
- Scopes
 - Direct emissions (scope 1)
 - Indirect emissions (scope 2)
 - Other indirect emissions (scope 3)

Transition to GHG reporting according to GRI / ISO 14064 / GHG protocol

Motivation

- Broader picture of environmental footprint of company
- Compliance with international standards / internationally applied standards
- Comparability with other companies

Challenges

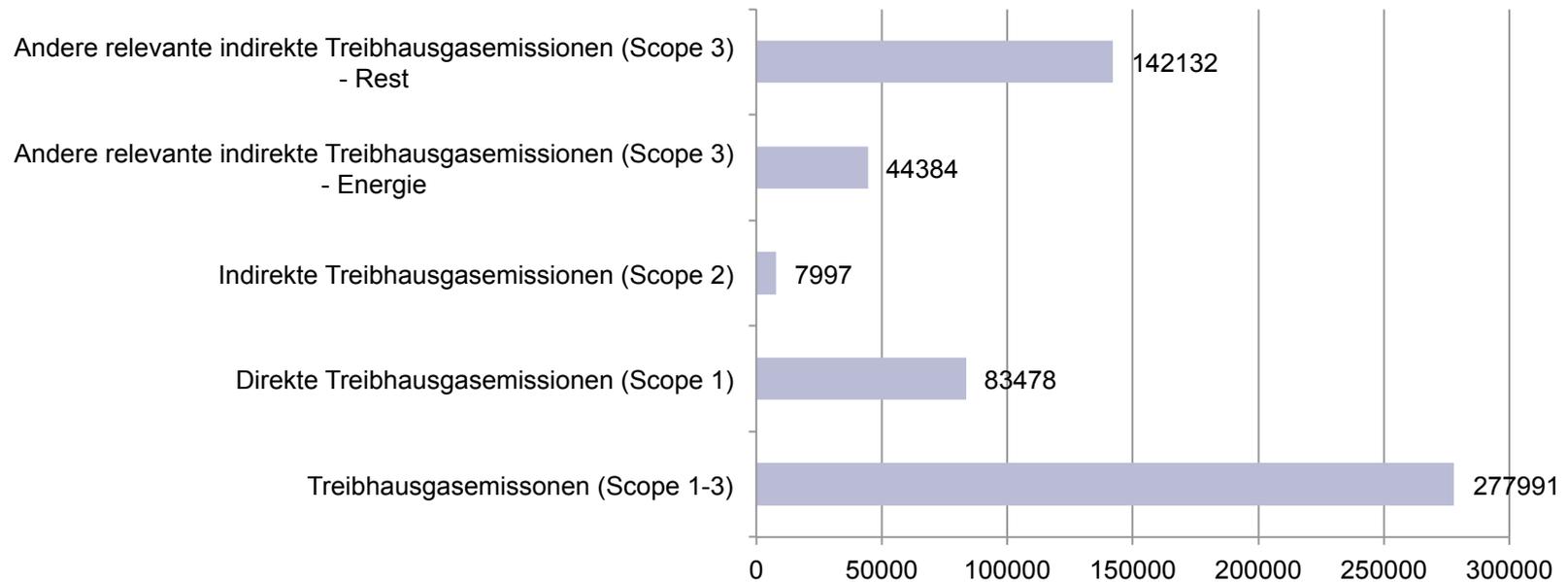
- Data availability for non-energy data (mass flow balance)
- Data availability & reporting processes for subsidiaries & investments
- Data reporting from contractors
- Emission factors

Motivation and challenges

	SBB	Subsidiaries	Contractors
Energy use	★★★	★★	-
Non-energy emissions	★★	★★	-
Material use	★★	-	-
Wastes / EOL	★★	-	-
Employee commuting	★★★	-	-
Product use	★★★	★★★	-
'Scope 4'	★★★	★★★	-

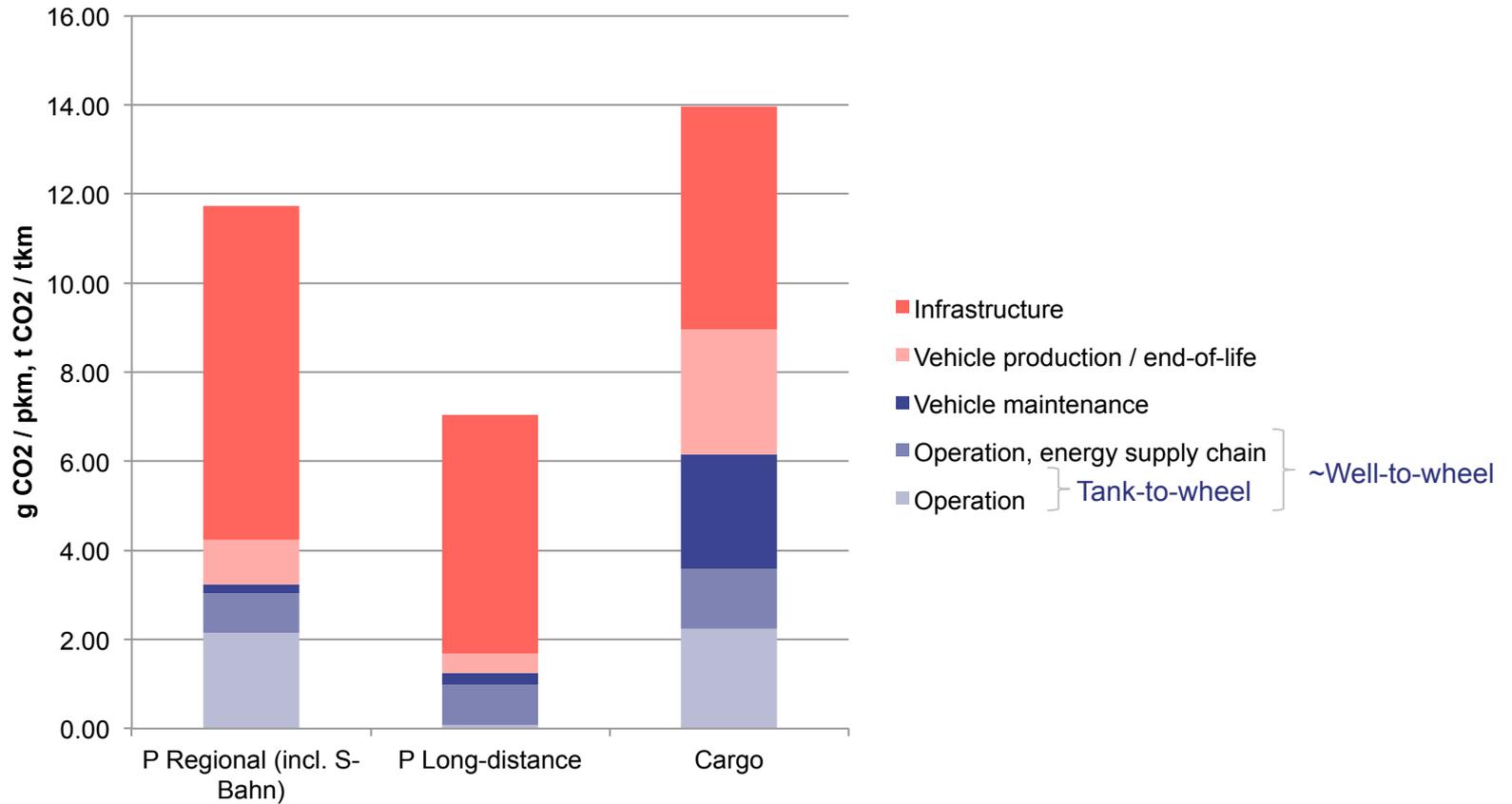
**Established data collection processes
and data quality**

Draft Greenhouse Gas Emissions in Scopes 1-3 (in t CO₂e)*



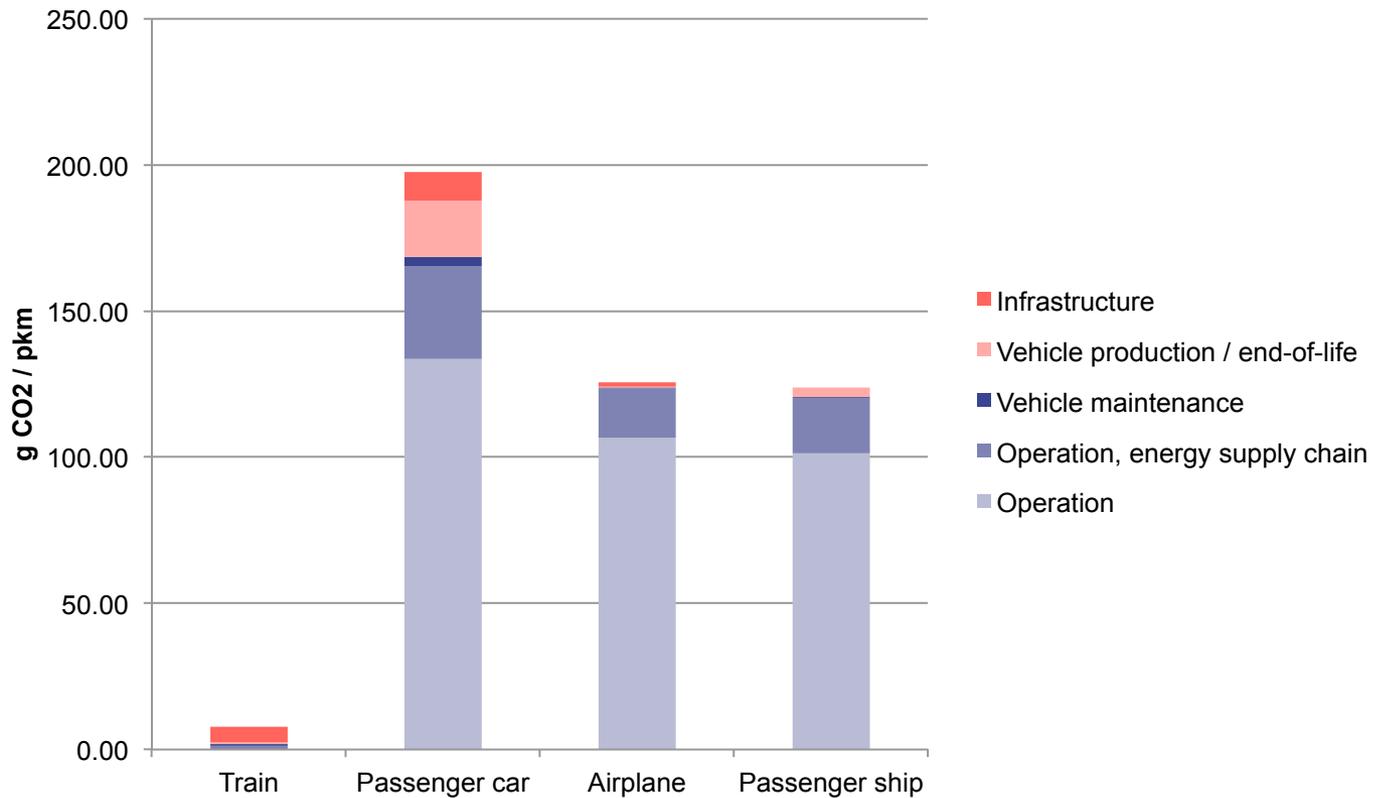
GHG reporting according to GRI / ISO 14064 (draft)

*incomplete material flow balance (procurement, EOL)



Specific CO₂-emissions of passenger and freight transport

Source: mobitool



Source: mobitool

Specific CO₂-emissions of transport modes

Online-Fahrplan

Von: Zürich-Flughafen Karte
 Nach: Bern Karte
 Datum: Di, 06.11.14
 Zeit: 08:21

Streckennummer	Ziel	Dauer	Umsch.	Reise mit	Information	Preis
Verbindungen von Di, 06.11.14						
1	Zürich-Flughafen	ab 08:13	3	IC	InterCity 712 Richtung Genève	
	Bern	an 09:28	5	IC		

Dauer: 1:15
 Fahrt 6. Nov bis 13. Dez 2014 täglich, nicht 8. & 9. Nov 2014

SBB Umweltrechner

Bei Ihrer geplanten Reise verursachen Sie 20 mal weniger CO₂ und Sie verbrauchen umgerechnet 19,7 Liter weniger Benzin gegenüber einer Fahrt mit dem Auto.

CO₂ (Kohlendioxid), Energieverbrauch und Reisezeit pro Fahrt

CO ₂ (Kohlendioxid)	Energieverbrauch	Reisezeit
<p>Trinkwasser, in kg pro Person und Fahrt</p> <p>0 6,71 25,2</p> <p>SahnVW Auto</p>	<p>Prozentsumme, umgerechnet in Liter Benzin pro Person und Fahrt</p> <p>0 2,8 12,7</p> <p>SahnVW Auto</p>	<p>Gesamtwertzeit, in Stunden pro Person und Fahrt</p> <p>0 0,55 0,55</p> <p>SahnVW Auto</p>

SahnVW durchschnittlicher Auslastungsfaktor
 Auto Durchschnittl. Schweiz (8 & 1700km), Motor: Durchschnittl. 1,8 Personen (Durchschnittl. Schweiz)
 Einstellungen ändern
 Weitere Indikatoren und Details anzeigen
 Reisezeit und nutzbare Zeit
 Ihre Reise durch Kombination von SahnVW, Velo und Auto individuell optimieren.

Zusatzinfos
 Zürich-Flughafen
 Bern
 Kantonsterrain
 Finanzämter
 Im SahnVW
 Hotel Suchen
 Reisezeit mit Handicap
 Bahnverkehrsverbände
 Hand um den SahnVW

Ihr Wetter in Zürich Flughafen
 Di | Fr | Sa
 ☁ | ☁ | ☁
 8° | 8° | 11°
 1° | 2° | 1°
meteo.centrals.ch

Ihr Wetter in Bern
 Di | Fr | Sa
 ☁ | ☁ | ☁
 1° | 1° | 1°
 1° | 2° | 2°
meteo.centrals.ch

Online-Fahrplan

mobi-tool

nachhaltige mobilität für unternehmen
pour une mobilité durable des entreprises

Home Kontakt Impressum Übermap (FR) (DE)

mobcheck - Wo steht Ihr Unternehmen?

Wo steht ihr Unternehmen?

Eingabe

In welcher Branche ist Ihr Unternehmen tätig?

Wo ist Ihr Unternehmen angegliedert?

Ist Ihr Unternehmen vornehmlich regional oder global tätig?

Wieviele Mitarbeiter sind in Ihrer Firma beschäftigt? Mitarbeiter

Die Resultate, die Sie rechts sehen, basieren auf allgemeinen Annahmen. Unten können Sie für jede der vier Verkehrsmittel mit den Parametern "spielen", z.B.: Wie würde es sich auswirken, wenn der Anteil jener MitarbeiterInnen, die mit dem öffentlichen Verkehr anreisen, verdoppelt würde?

Abschätzung für Unternehmen
 Bitte wählen Sie einen Indikator:
 Energie CO₂ Kosten Zeit

Gesamtverkehr 107 t CO₂
 Produktion / Gebäude 263 t CO₂

Durch die Kombination von verschiedenen Mobilitätsmaßnahmen lässt sich der betriebliche Verkehr um 100-200% reduzieren (Erfahrungswert). Wählen Sie selbst: Reduktion des betrieblichen Verkehrs um: t CO₂

Detailparameter zeigen
 Pendlerverkehr Güterverkehr Kundenverkehr Geschäftsverkehr Allgemein

Annahmen für Pendlerverkehr

Distanz Pkw (Wohnort - Firma) km (nur Hörsung)
 Distanz ÖV (Wohnort - Firma) km (nur Hörsung)
 Anzahl Tage Telearbeit / (durchschnittl. alle Mitarbeiter) Tage / Woche

www.mob-tool.ch/mobcheck/autosinn/Landde/1
 www.mob-tool.ch/mobcheck/autosinn/Landde/1

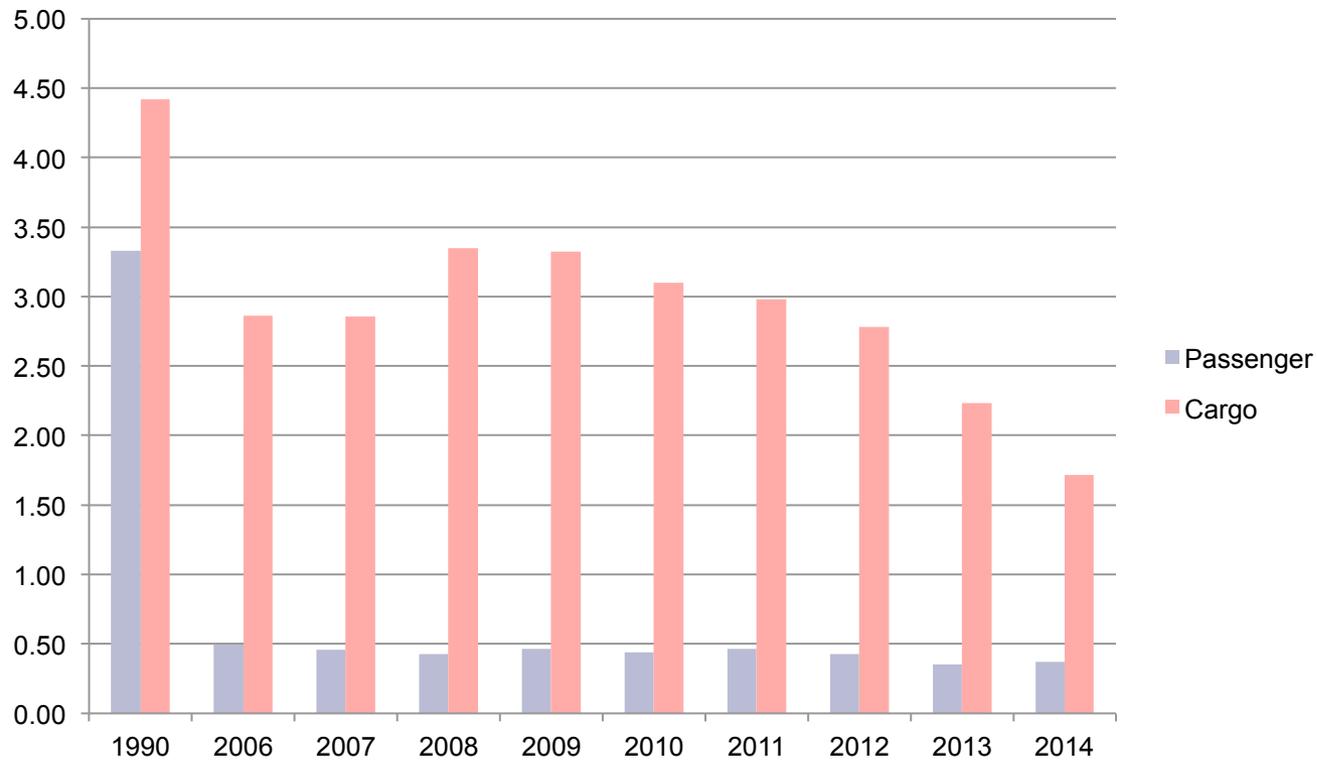
Pkw / Liter ÖV / Bahn / Telearbeit Flug
 6. Nov 14 8:35 v1.0

Tools & databases applying LCA system boundary





Tools applying DIN EN 16258
(tank-to-wheel / well-to-wheel)



Specific CO₂-emissions of transport modes (well-to-wheel).

Summary

- Corporate GHG reporting
 - Currently only energy-related emissions
 - Planned to adapt system boundaries and structure of GHG protocol / GRI
 - Main challenges
 - data availability of indirect emissions (material flow balance)
 - data availability and reporting processes for subsidiaries and contractors
- Specific GHG KPIs
 - High relevance of specific GHG KPIs in transport sector
 - Different system boundaries for different products / purposes, some include scope 3 emissions

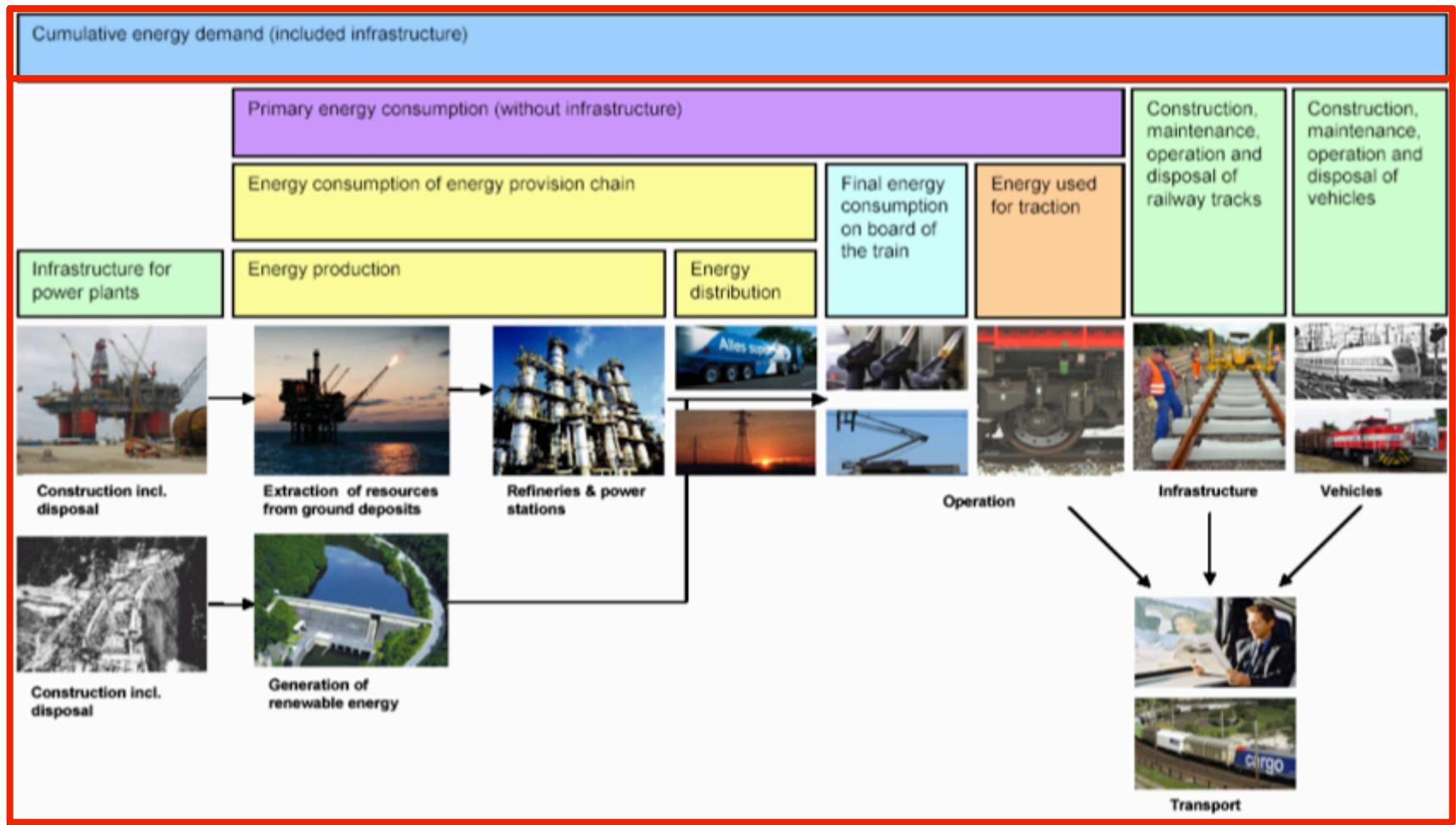
Q & A



Thank you for your attention!

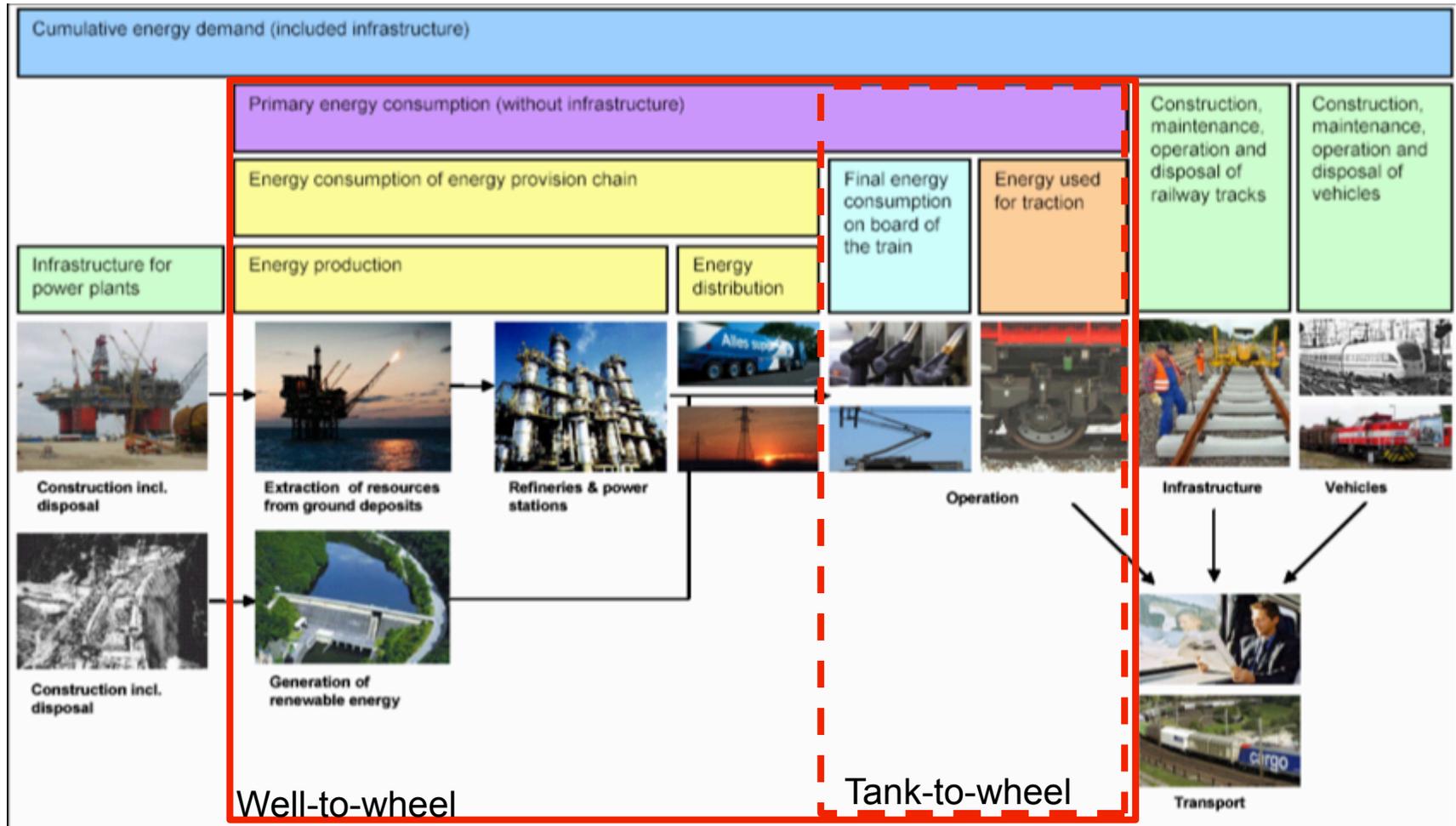
ANNEX

System boundaries: Life Cycle Assessment (LCA). Umweltrechner, mobitool, ecoinvent database, a.o.



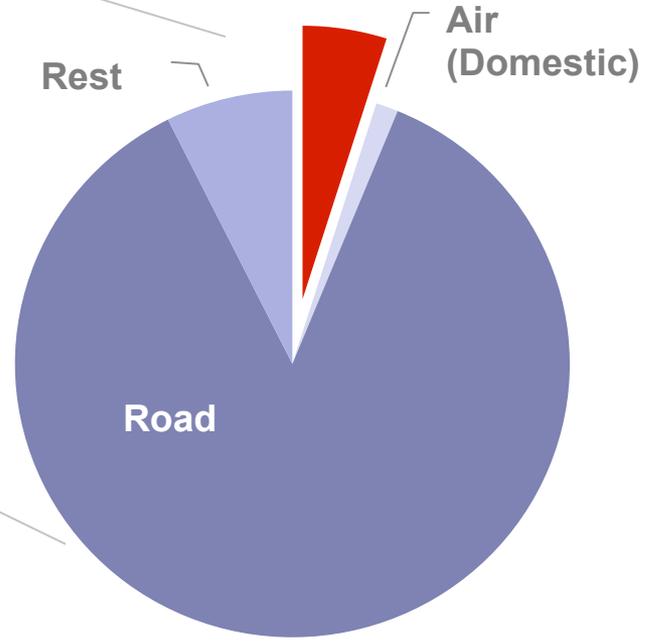
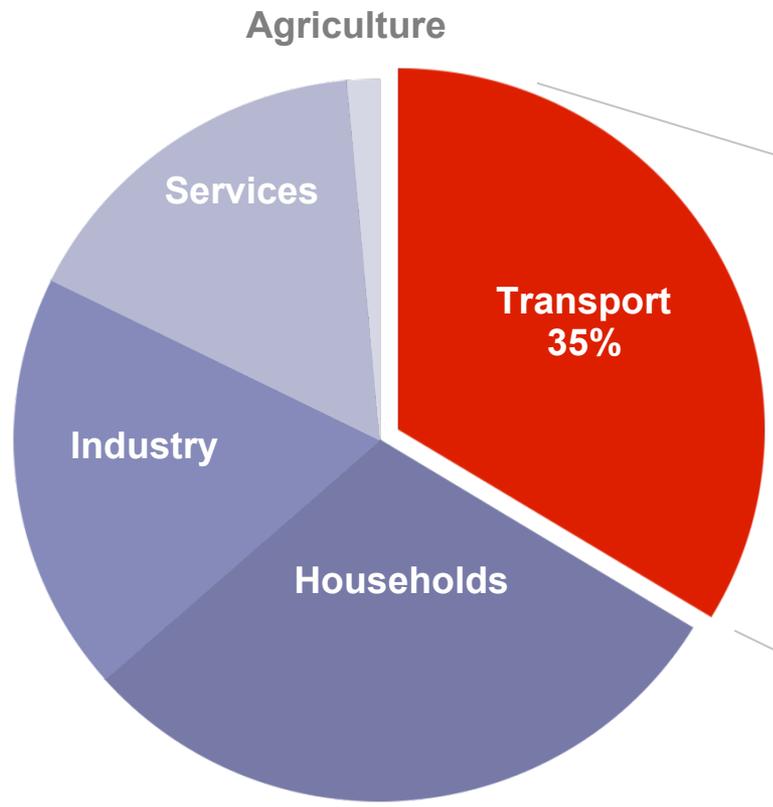
*ISO 14041, 14044: Environmental Management – Life Cycle Assessment

System boundaries: DIN EN 16258* Eco-Passenger, EcoTransit, a.o.



*DIN EN 16258: Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)

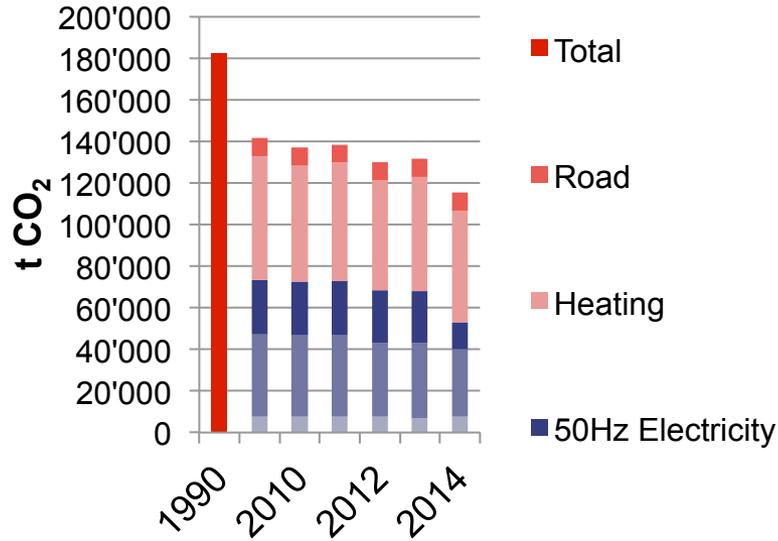
With only 5% share of final energy consumption in the transport sector the railway provides 17% (passenger) and 36% (freight) of transport services.



Energy consumption of railway traffic.

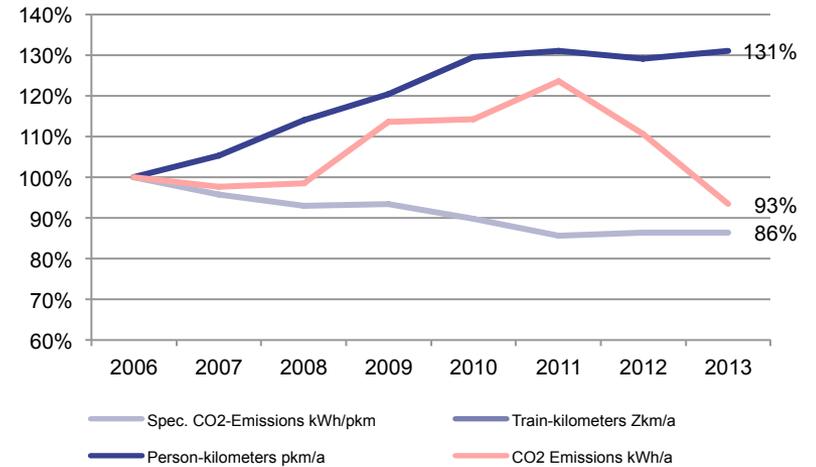
Source: Swiss Federal Office of Energy and Swiss Federal Statistical Office 2013

Total CO₂-Emissions SBB

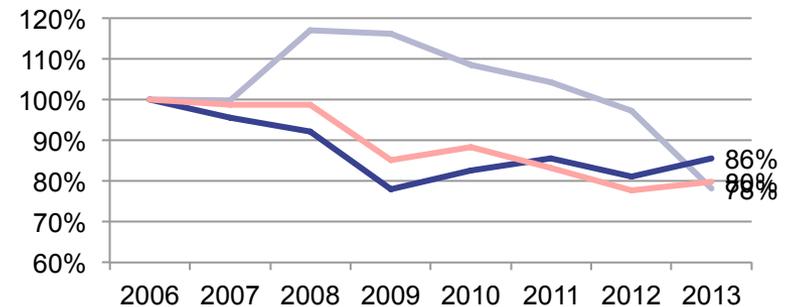


Specific CO₂-emissions (well-to-wheel)

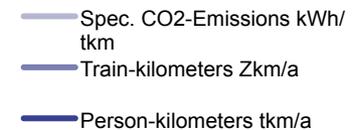
Passenger traffic

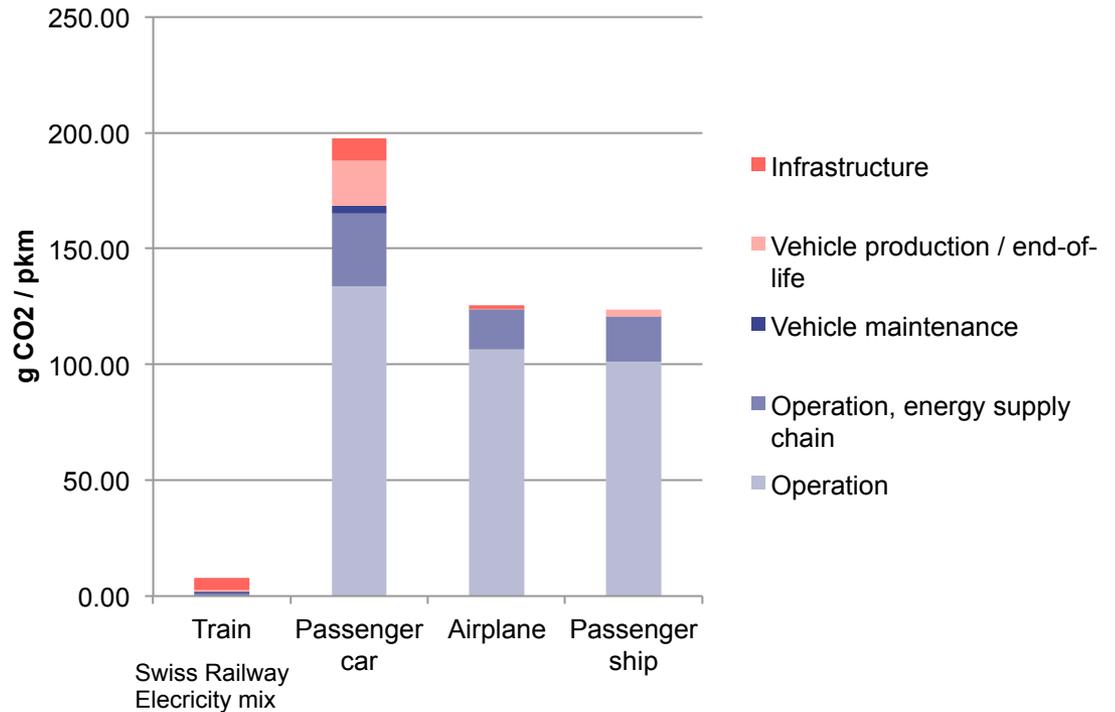
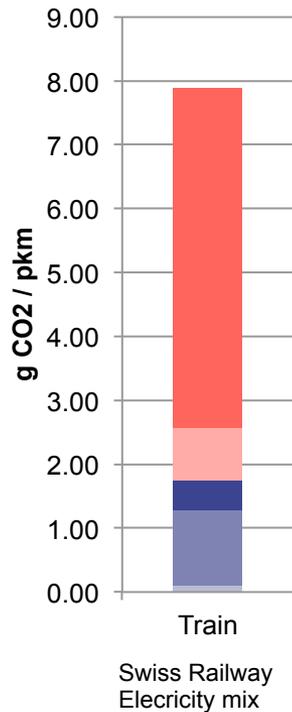


Freight traffic



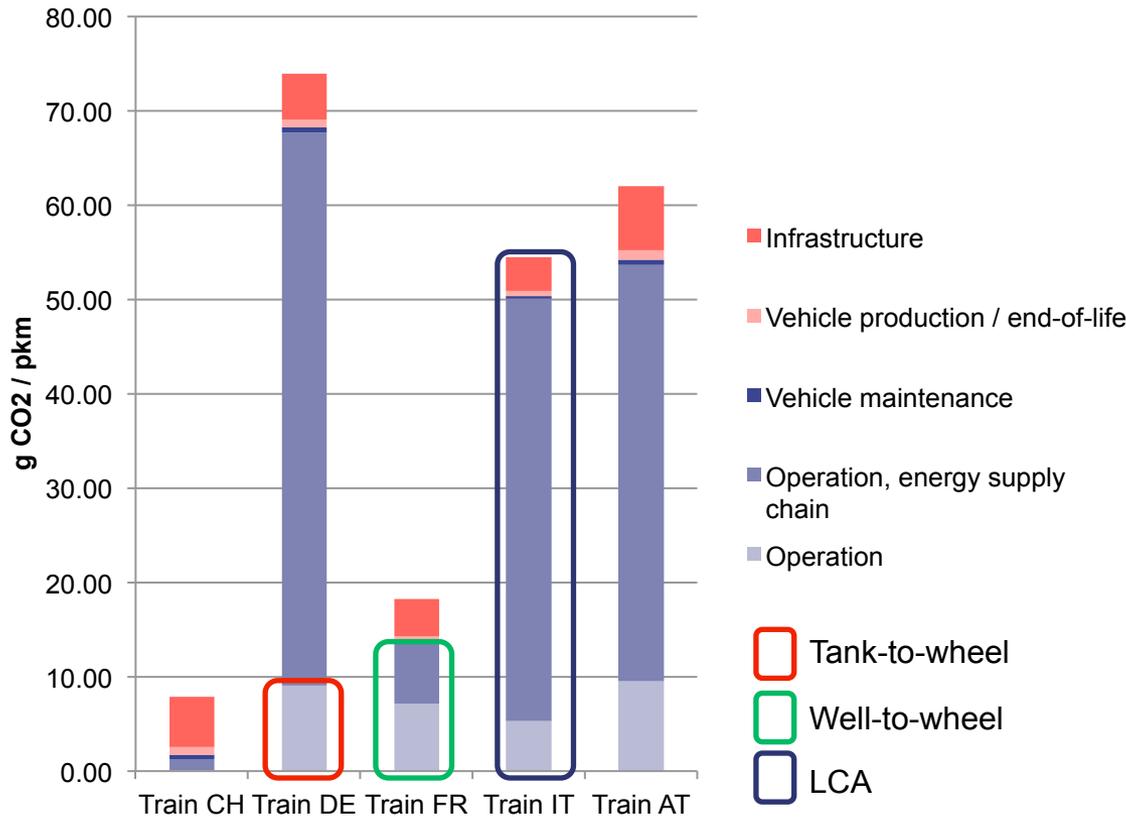
Specific CO₂e-Emissions 1990-2014.





Specific CO₂e-emissions of transport modes.

Source: mobitool



Contributions to LCA score (Train CH)

- 1% Operation
- 15% Energy supply chain
- 6% Vehicle maintenance
- 11% Vehicle production
- 67% Infrastructure

System boundaries