



External Effects and Transport Policy in Switzerland



Seminar Center for Future Sustainable Mobility, ETHZ, 28 November 2023

Nicole Mathys and Joséphine Leuba, *Basis* Section, ARE



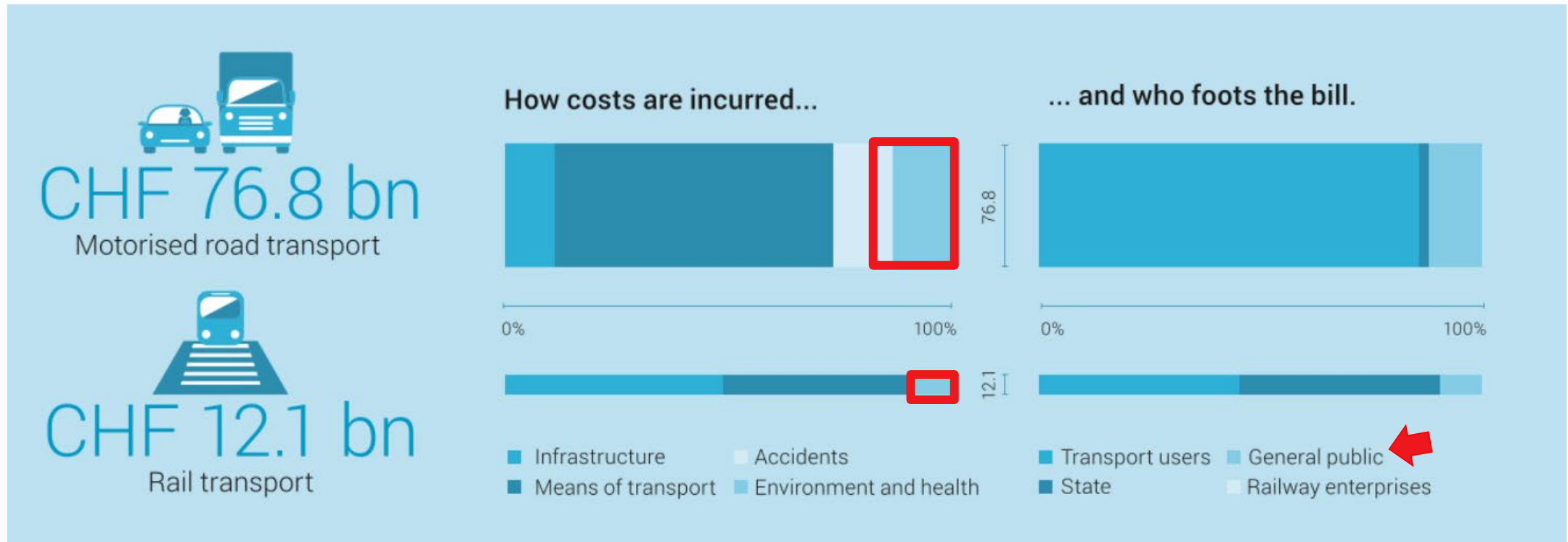
Content

- External costs and benefits of transport in Switzerland
- Link to transport policy
- Ongoing methodological revision



Total Costs of Transport 2019

[Costs and funding of transport | Federal Statistical Office \(admin.ch\)](https://www.admin.ch) :



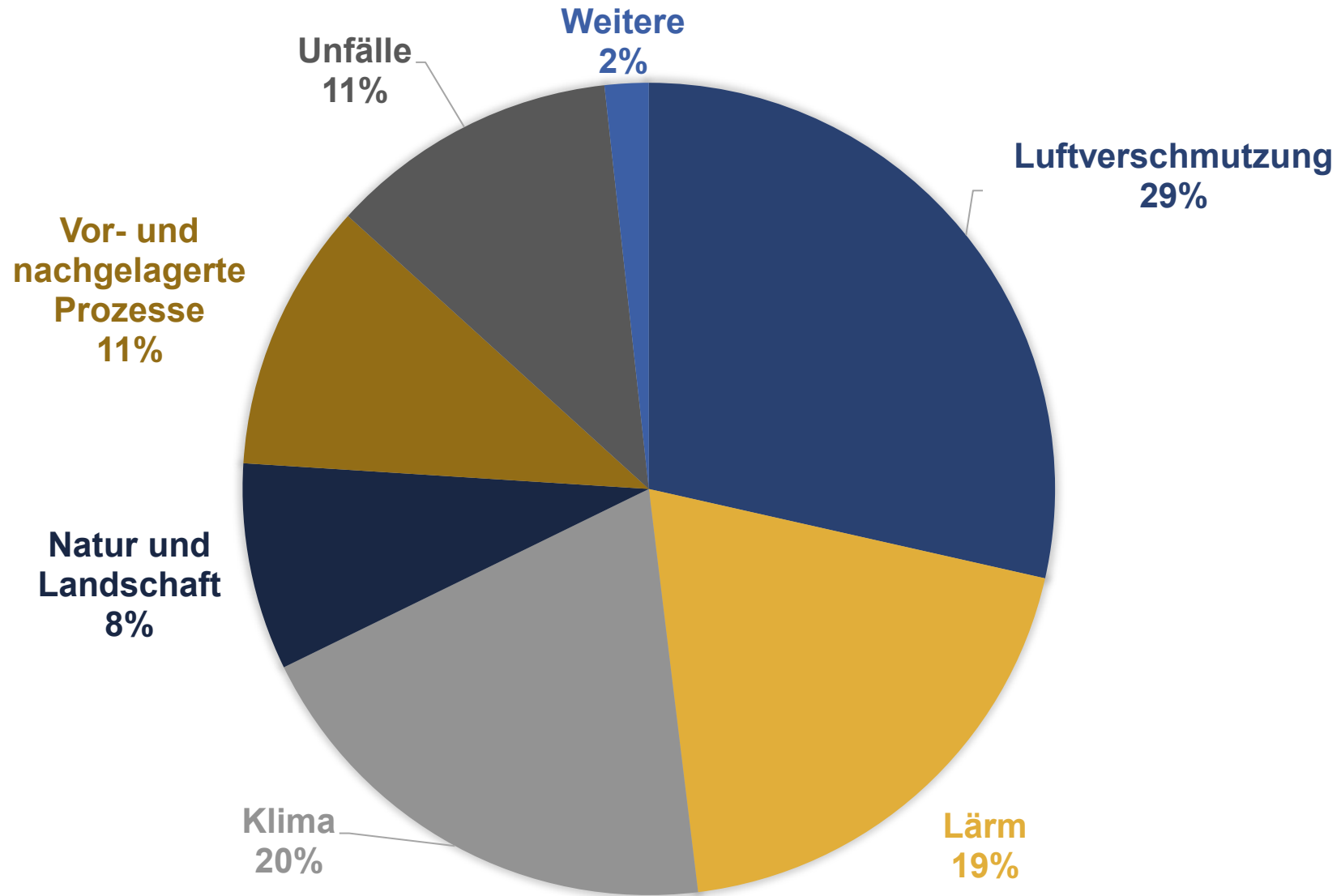


Our duty

- yearly estimation of **comprehensive & coherent** external effects of transport for **all modes** for Switzerland
 - publication total cost of transport
 - HVC-coverage
 - bases for transport policy
- as far as possible: use official data & state-of-the art methods

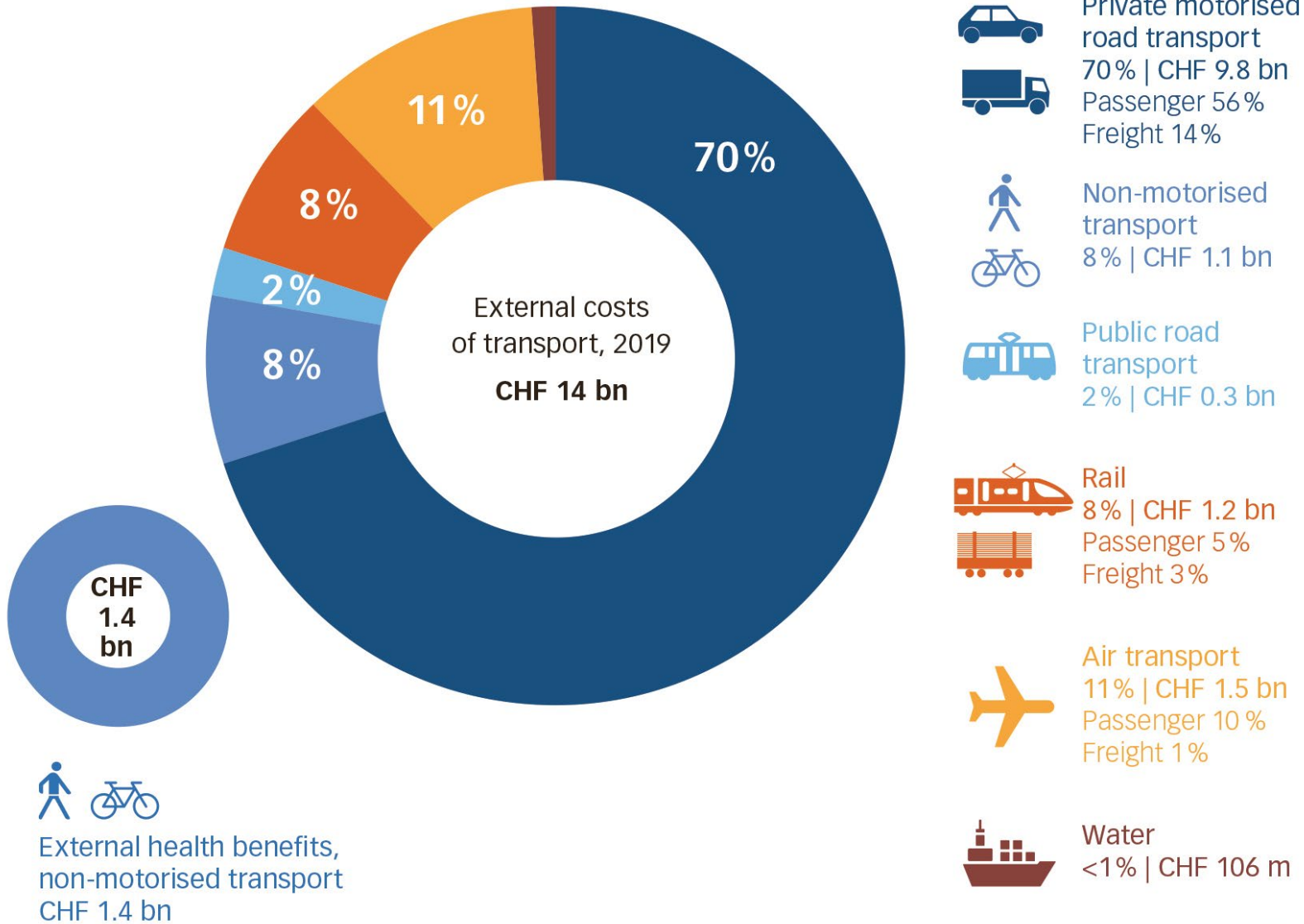


External Costs of transport 2019 (total = 14 bn CHF)

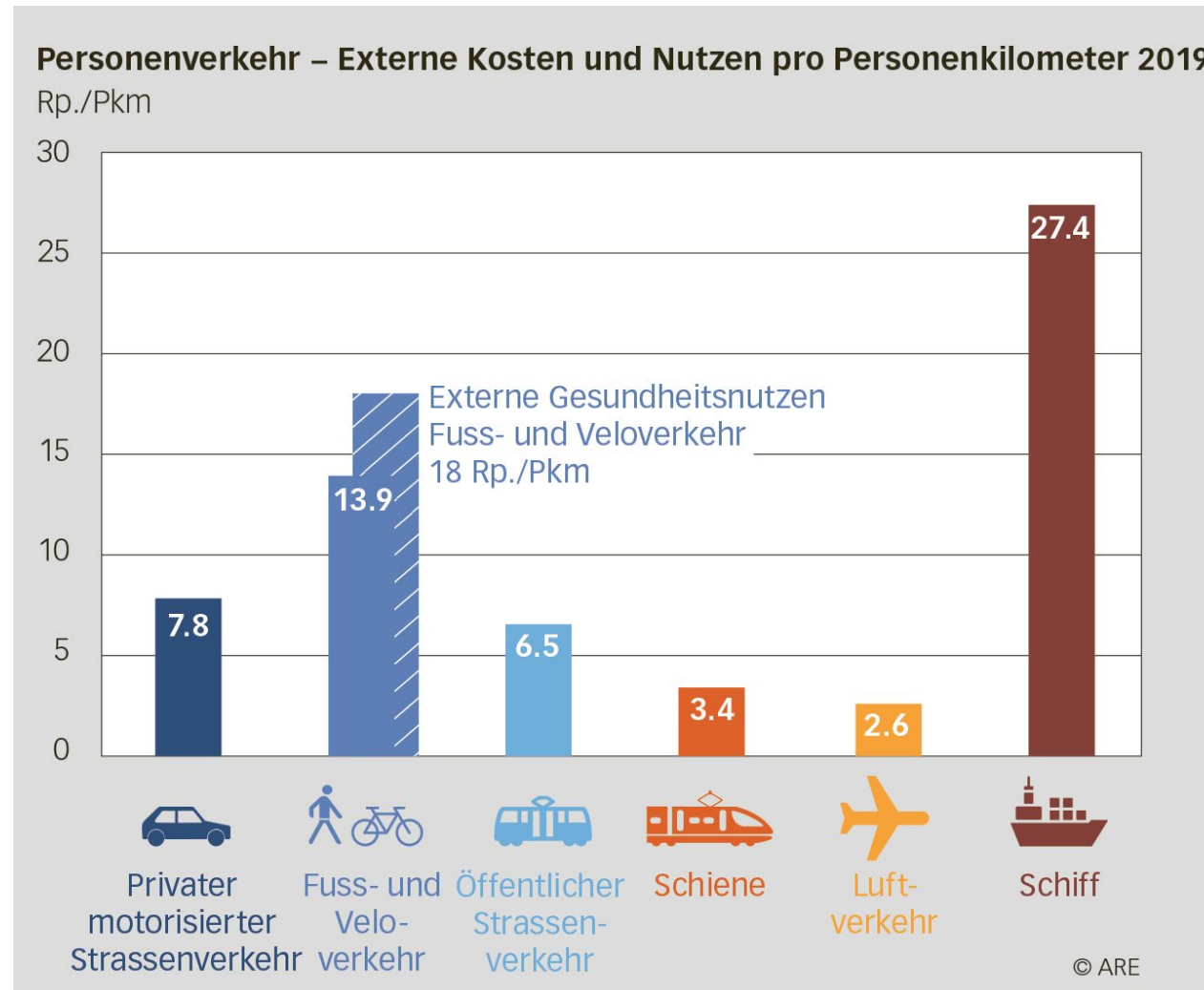




Total external costs and benefits of transport, 2019

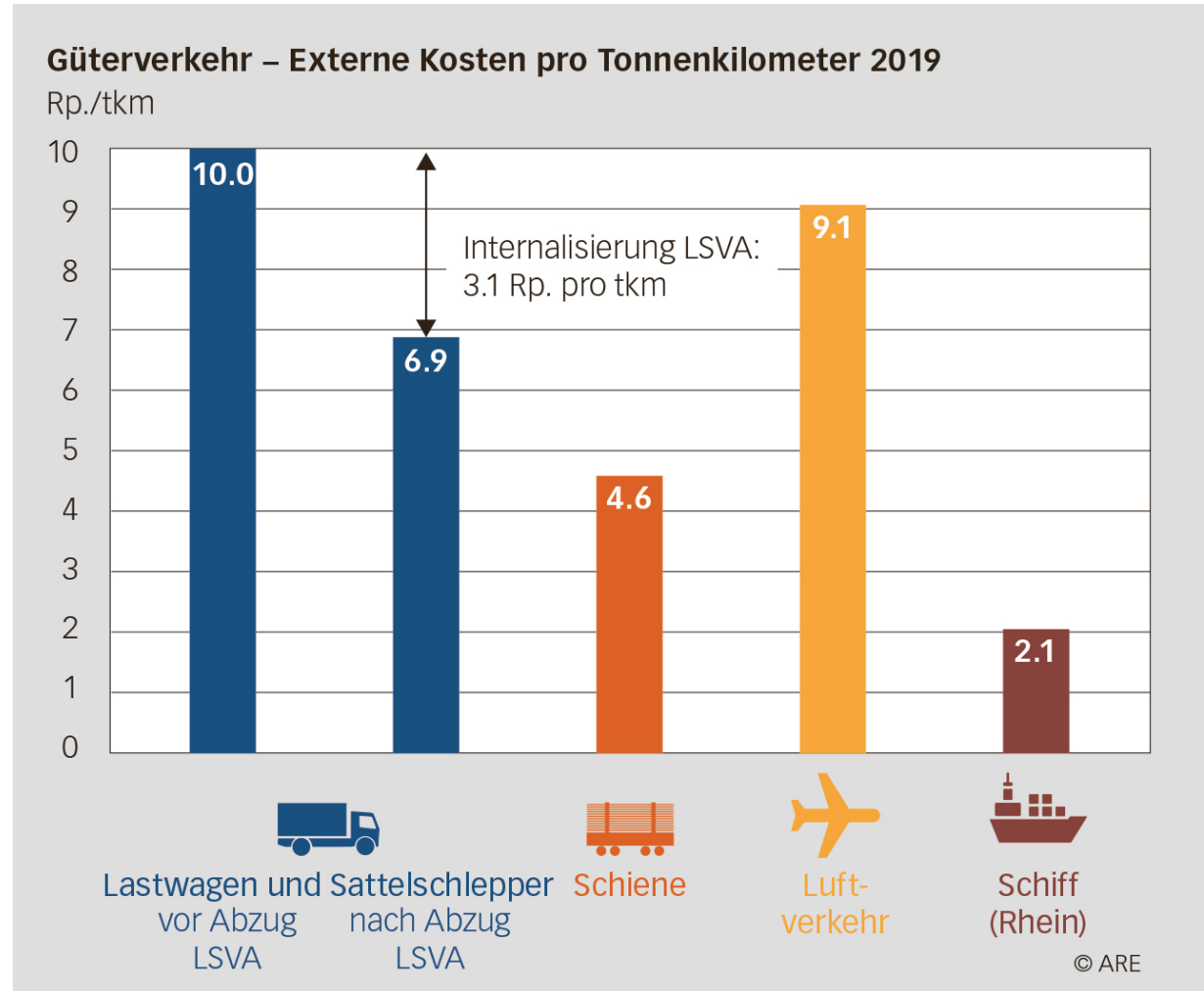


Unit costs – passenger transport





Unit costs – freight transport





Some key parameters & databases for 2019

- Transport and kilometre performance: [Federal Statistical Office](#)
- Emission factors – direct emissions (PM10, CO₂, NO_x, ...): HBEFA 3.3
- Emission factors – upstream and downstream processes: Ecoinvent 3.3
- Cost of CO₂ : 137 CHF / ton (see [report](#) pp.71-72)
- Value of statistical life (see [fact sheet](#)) : 6.9 million CHF
Value of a life year lost: 246'500 CHF



Existing instruments of internalisation

- [Distance-related heavy vehicle fee \(HVF\)](#)
- CO₂-Act (2011)
 - Art. 13: [CO₂ regulations for vehicles](#)
 - Art. 26-28: [Compensation obligation for fuel importers](#)
- Aviation landing fees ([noise](#) and [air pollution](#))

... representing **~750 mios CHF (<5% of the total)**

75% of this amount from the heavy vehicle fee



Cost-benefit analyses of infrastructure projects

Infrastructure projects submitted to cost-benefit analyses (CBA):

- **Road:** [Nachhaltigkeits-Indikatoren für STRAsseninfrastrukturprojekte \(NISTRA\)](#)
- **Rail:** [NIBA: Nachhaltigkeitsindikatoren für Bahninfrastrukturprojekte](#)



Congestion costs 2019

Kosten durch Überlastung der Transportinfrastruktur



Überlastete Strassen und Züge kosten die Schweizer Volkswirtschaft jährlich mehrere Milliarden Franken. Das Bundesamt für Raumentwicklung (ARE) berechnet die Zeitverluste auf der Strasse und die Komfortkosten für den öffentlichen Verkehr.

2019	Werktage (Mo.-Fr.)	Wochenendtage (Sa./So.)	Total
Personenwagen (PW)	2'359	350	2'708
Lieferwagen (LI)	242	34	275
Schwere Nutzfahrzeuge (SNF)	145	3	148
Total	2'746	386	3'131



Getragene Zeitverlustkosten nach Fahrzeugkategorien (Mio. CHF/Jahr).

Quelle: ARE (2022): Kosten der Überlastung der Transportinfrastruktur (KÜTI) Grundlagenstudie



Ongoing revision of the calculation methods (2022-2024)

- Externality from the individual point of view (vs transport mode until now)
 ➡ integration of congestion costs
- General update of:
 - Basisdata (ex: update immissions model Pollumap)
 - Key parameters (ex: cost of carbon)
 - Damage functions (ex: health effects)
- Separate results for E-Mobility
- Spatial differentiation: cantonal results ; urban/rural distinction



Take - home

- Economic and statistical analysis are essential for policy making
- Every year, transport generates health and environmental costs of 14 billion CHF, that are borne by society
- Some internalisation (5%) takes place. External costs enter CBA of infrastructure projects
- ...but we are currently far away from a general application of the polluter-payer principle
- Methodological improvements to calculations (always) ongoing



Discussion



Back-up

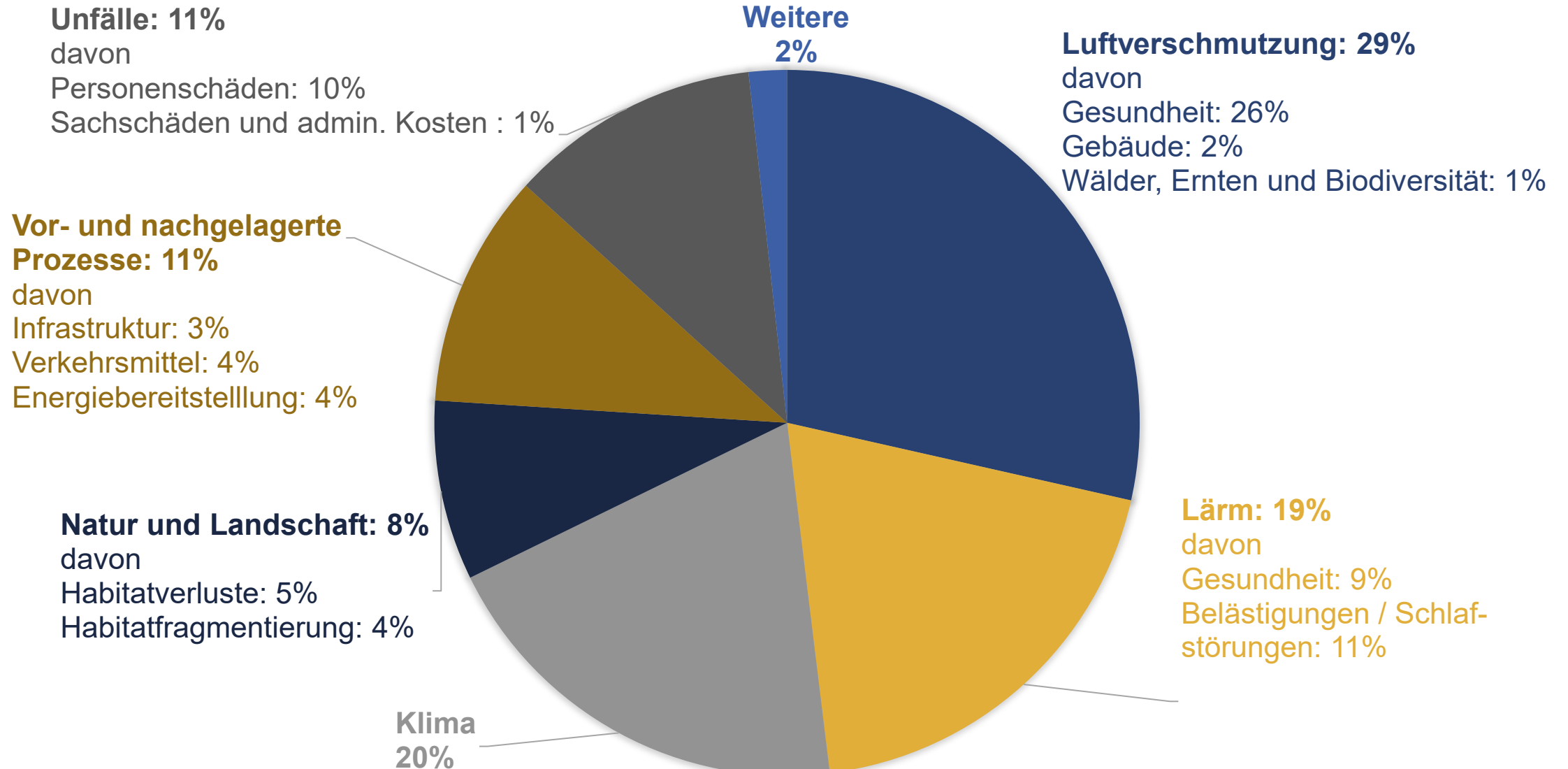


Further Information

- [Costs and funding of transport | Federal Statistical Office \(admin.ch\)](#)
- [External costs and benefits of transport | Federal Office for Spatial Development \(admin.ch\)](#)
- [Kosten durch Überlastung der Transportinfrastruktur | Federal Office for Spatial Development \(admin.ch\)](#)

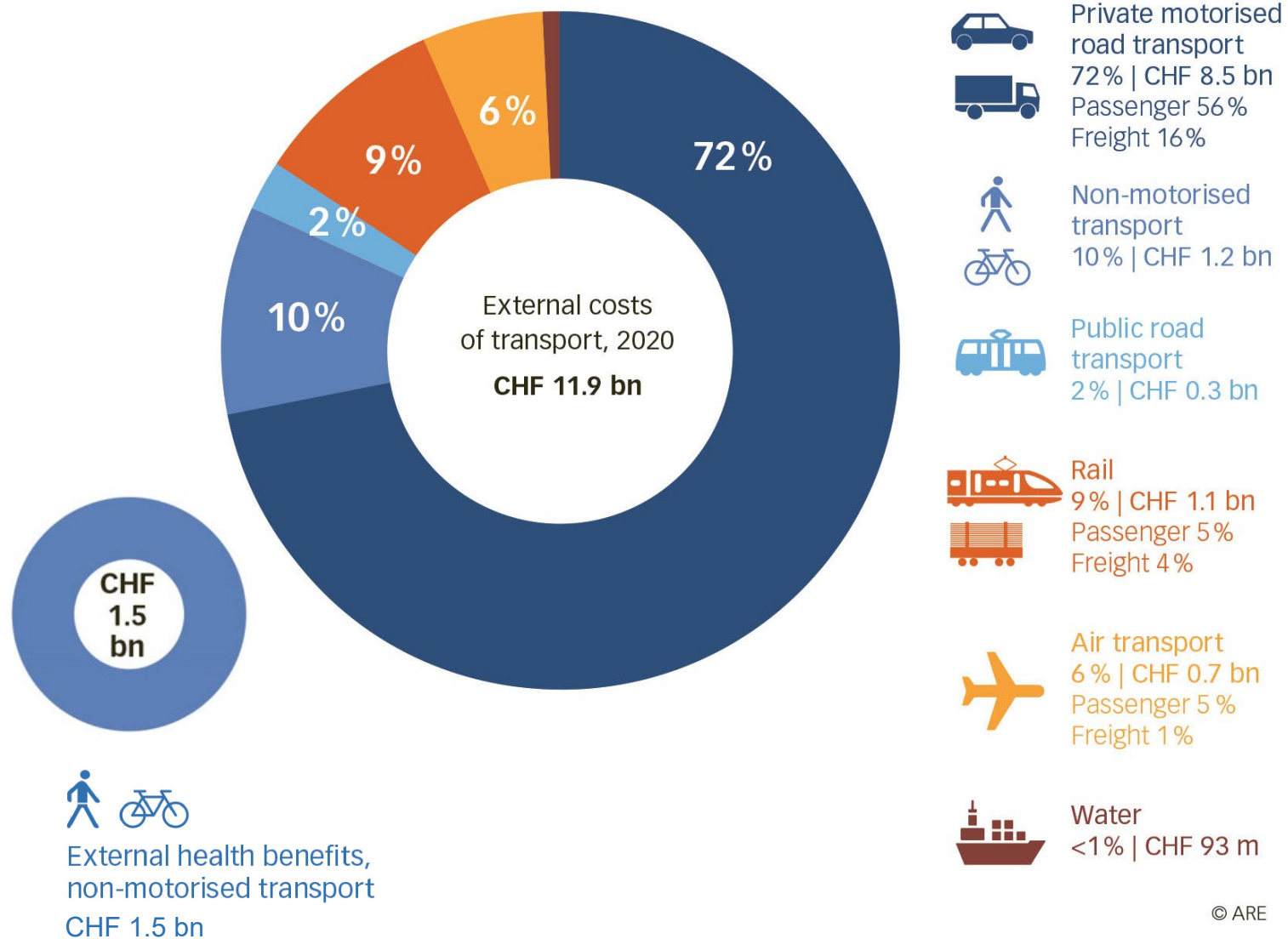


External Costs of transport 2019 (total = 14 bn CHF)





Total external costs and benefits of transport, 2020



© ARE



Evolution External Effects 2010-2020

Veränderungen Externe Kosten und Nutzen des Verkehrs 2010-2019 und 2019-2020 nach Kostenbereich und Nutzen, durchschnittliche jährliche Wachstumsrate										
	Strasse		Schiene		Luftverkehr		Schiff		Total	
	2010 - 2019*	2019 - 2020	2010 - 2019*	2019 - 2020	2010 - 2019*	2019 - 2020	2010 - 2019*	2019 - 2020	2010 - 2019*	2019 - 2020
Luftverschmutzung	+3.8%	-15.7%	+2.2%	-16.3%	+4.1%	-54.9%	-1.8%	-14.9%	+3.5%	-16.3%
Lärm	+5.5%	-10.1%	+2.1%	-0.1%	+4.2%	-51%	-	-	+4.8%	-10.3%
Klima	+3.9%	-17.3%	-0.2%	+2.4%	+6.2%	-58.6%	+1.2%	-15.5%	+4.8%	-34.0%
Natur und Landschaft	+2.2%	+0.1%	+0.8%	+2.4%	+2.0%	0.2%	+0.6%	+0.5%	+2.0%	+0.4%
Vor und nachgelagerte Prozesse	+3.6%	-9.1%	+2.8%	+7.9%	+3.9%	-42.8%	-0.4%	-2.0%	+3.6%	-12.7%
Unfälle	-0.9%	+5.1%	+0.7%	-26.9%	+8.2%	-61.3%	+1.2%	-11.2%	-0.9%	+4.8%
Weitere	-0.1%	-12.5%	+1.8%	-0.8%	-	-	-	-	+0.4%	-9.4%
Abzug LSVA-Anteil	-1.7%	+11.6%	-	-	-	-	-	-	-1.7%	+11.6%
Total	+3.3%	-10.7%	+2.0%	-5.7%	+5.6%	-55.5%	-1.3%	-13.8%	+3.4%	-15.2%
Gesundheitsnutzen Fuss- und Veloverkehr	+1.6%	+7.4%	-	-	-	-	-	-	+1.6%	+7.4%

Kostensteigernde Faktoren



mehr zurückgelegte km



Bevölkerungswachstum



steigende Preise

Kostensenkende Faktoren



weniger Unfälle durch Personenwagen



sinkende Emissionsfaktoren

© ARE

Tabelle 3

©ARE

* Die Spalten 2010-2019 geben die durchschnittliche jährliche Wachstumsrate an