Interreg Europe

European Union | European Regional Development Fund

University of Natural Resources and Life Sciences, Vienna

Bicycles vs. Cars Financial Effects

a Comparison

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◄ Sources: David Gerstein „Monument for the XXe Century", (Annecy, 2008-05-26) & bikes http://www.marcusgloger.de/

Internal and external costs in transport

- **Costs-by-cause principle:** Who uses/damages something, pays for it (environmentally: "**Polluter pays principle**")
- **Internal costs**
  paid by the respective user of this mode of transport
- **External costs**
  not paid by the individual transport user,
  ultimately paid by the general public (tax-payer)

Economic effects (CBA), comparison of bicycle- and car-traffic, calculated for Vienna (2009)

Gregor Trunk (2011): *Overall economic comparison of bicycle- and car-traffic. A contribution to the sustainability debate*. Master thesis, Institute for Transport Studies, University of renewable resources and life sciences (BOKU), Vienna

Trunk, G. (2010). Gesamtwirtschaftlicher Vergleich von Pkw- und Radverkehr; Ein Beitrag zur Nachhaltigkeitsdiskussion Universität für Bodenkultur]. Wien.

Costs for the overall economy [Vienna 2009, €-ct per km]

Indicator [€-ct/km]	Internal		External		Total	
	Bicycle	Car	Bicycle	Car	Bicycle	Car
Health	-	-	89.89	-	89.89	-
Noise	-	-	-	-1.02	-	-1.02
Accidents	-6.29	-1.44	-8.42	-1.85	-14.71	-3.29
Running costs	-10.20	-38.30	-	-	-10.20	-38.30
Travel time	-66.53	-54.29	-	-	-66.53	-54.29
Pollutants	-	-	-	-0.63	-	-0.63
Climate - CO_2	-	-	-	-0.85	-	-0.85
TOTAL	**-83.02**	**-94.03**	**81.47**	**-4.35**	**-1.55**	**-98.38**
DIFFERENCE bicycle-car	11.01		**85.82**		96.83	

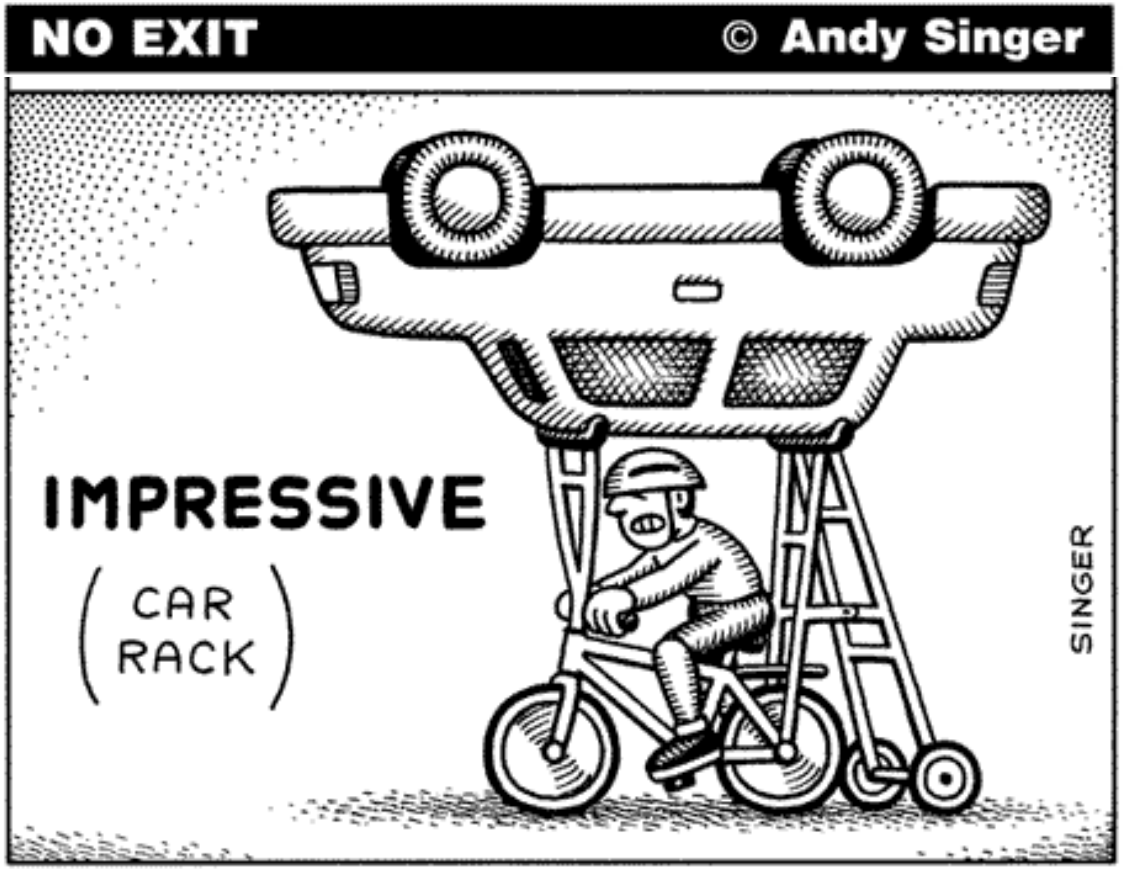
Trunk, G. (2010). Gesamtwirtschaftlicher Vergleich von Pkw- und Radverkehr; Ein Beitrag zur Nachhaltigkeitsdiskussion Universität für Bodenkultur]. Wien.

Bicycle vs. car, costs in Mio. € per year (Vienna 2009)

Indicator [Million € per year]	Internal		External		Total	
	Bicycle	Car	Bicycle	Car	Bicycle	Car
Health	-	-	247.7	-	247.7	-
Noise	-	-	-	-44.3	-	-44.3
Accidents	-17.3	-62.6	-23.2	-80.4	-40.5	-143.0
Running costs	-28.1	-1,665.2	-	-	-28.1	-1,665.2
Travel time	-183.3	-2,360.5	-	-	-183.3	-2,360.5
Pollutants	-	-	-	-27.4	-	-27.4
Climate-CO_2	-	-	-	-37.0		-37.0
TOTAL	-228.8	-4,088.3	**224.5**	**-189.1**	-4.3	-4,277.4
DIFFERENCE bicycle-car	**-4,317.1**		**35.4**		**-4,281.7**	

Trunk, G. (2010). Gesamtwirtschaftlicher Vergleich von Pkw- und Radverkehr; Ein Beitrag zur Nachhaltigkeitsdiskussion Universität für Bodenkultur]. Wien.

Actually, it´s the other way round – car traffic heavily subsidized



Source: Andy Singer, http://andysinger.com/

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(A) Definitions

(B) The Viennese Study 2010

(C) Update 2021 (Climate, Health etc.)

(D) Conclusions & Actions needed

◄ Source: http://www.marcusgloger.de/

Updating 2009 external costs …

Pollutant	VOH	NO_x	PM_{10}	Pollutants total	2009, costs per	CO_2 *)
External costs [ct/km]	0.02	0.30	0.31	0.63 [ct/km]	vehicle kilometre	0.85 [ct/km]

*) for 2009 we used: ***€ 50 /t CO_2*** (average CO_2 emission: 170 g/km)

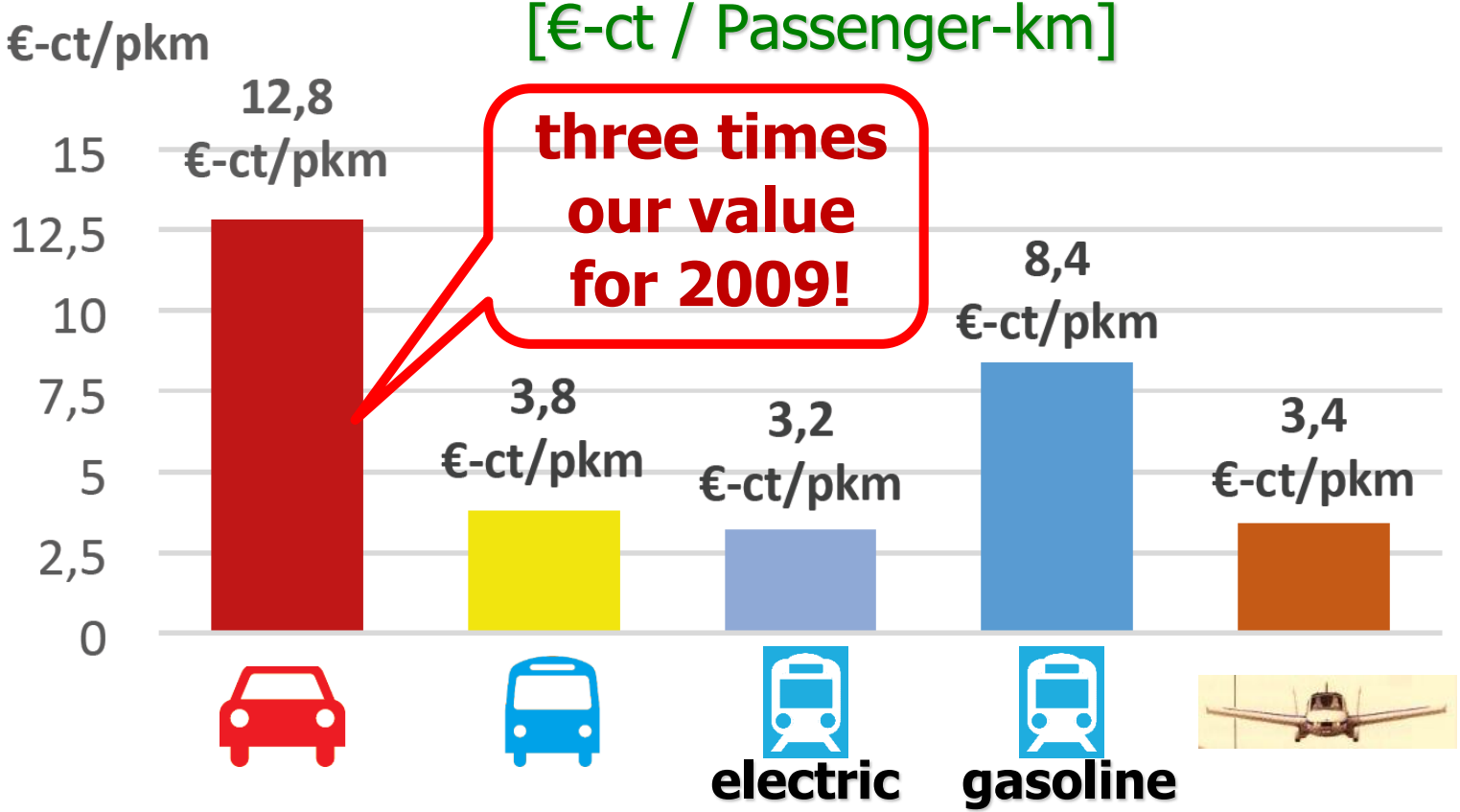
Recent studies use higher "Social Costs of Carbon" (SCC), the approach is made either via **"damage costs"** or **"avoidance costs".**

- *$ 20–100 /t CO_2 (UK's 68% reduction by 2030)*
- *€ 195 and € 680 /t CO_2 (Germany's 2020 guidance)*
- *€ 100/t CO_2 equivalent (EC: "short-&-medium-run costs up to 2030")*
  € 269/t CO_2 equivalent (EC: "for the long run costs up to 2060").

Van Essen, H., van Wijngaarden, L., Schroten, A., Sutter, D., Bieler, C., Maffii, S., Brambilla, M., Fiorello, D., Fermi, F., & Parolin, R. (2020). Handbook on the external costs of transport, version 2019.1. https://doi.org/https://op.europa.eu/s/pLqH http://doi.org/10.2832/27212

Wagner, G., Anthoff, D., Cropper, M., Dietz, S., Gillingham, K. T., Groom, B., Kelleher, J. P., Moore, F. C., & Stock, J. H. (2021). Eight priorities for calculating the social cost of carbon. In: Nature Publishing Group.

Handbook of the External Costs in the EC 2019



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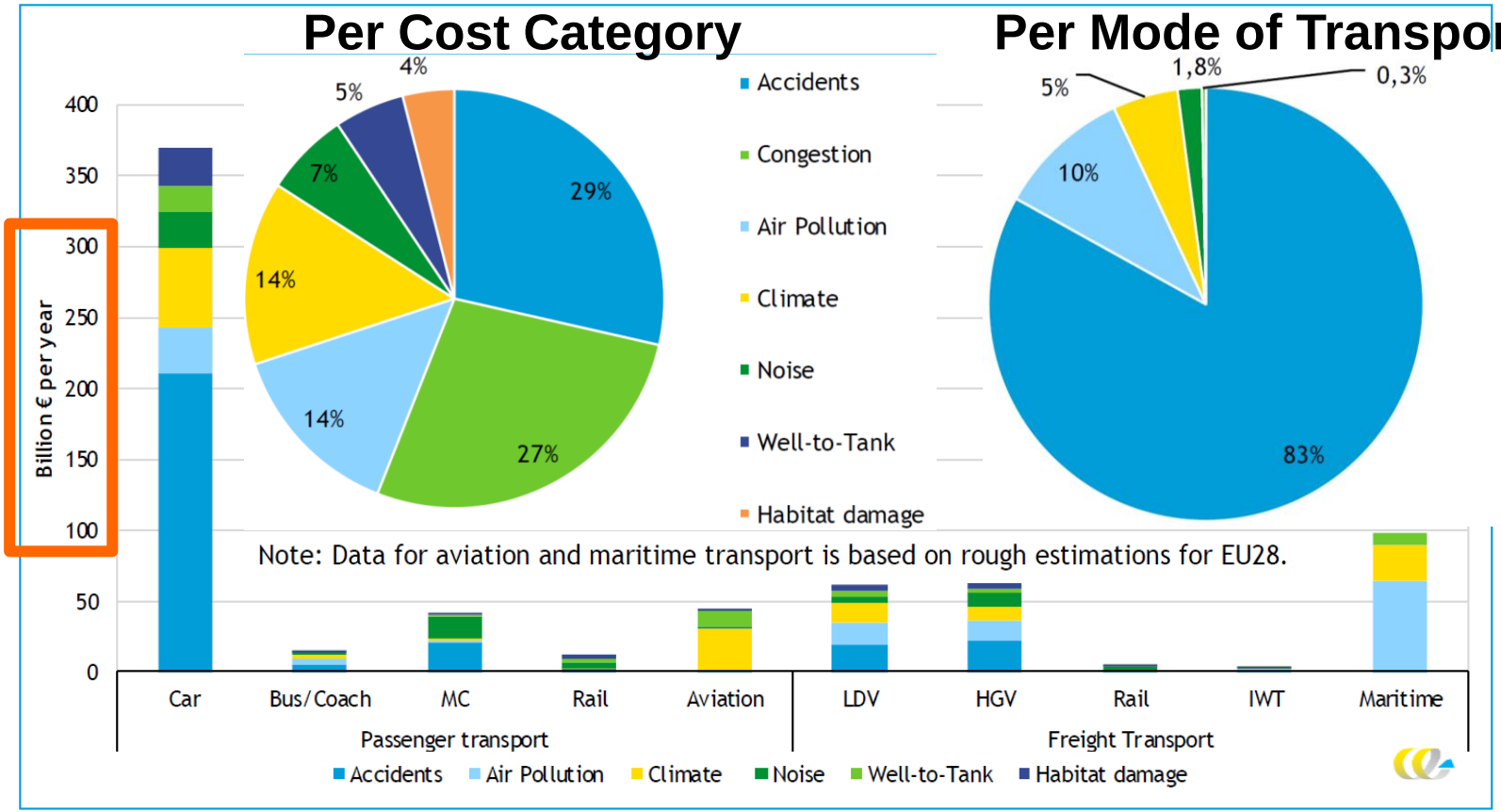
FSV. (2021). Ökosoziale Steuerreform als Schlüsselmaßnahme für den Verkehrssektor. In FSV (Ed.), Berichte aus der Österreichischen Monitoring-Gruppe Klimaübereinkommen und Verkehr. Wien: Österreichische Forschungsgesellschaft Straße - Schiene - Verkehr (FSV).

Total External Costs 2016 for EU28 (Billion €/year)



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EC – Handbook, Externalities covered

Table 12 - Externalities covered in this study

Externality	Road	Rail	IWT	Maritime	Aviation
Accidents	✓	✓	✓	✓	✓
Air pollution	✓	✓	✓	✓	✓
Climate change	✓	✓	✓	✓	✓
Noise	✓	✓			✓
Congestion	✓				
Well-to-tank emissions[a]	✓	✓	✓	✓	✓
Habitat damage	✓	✓	✓		✓

[a] Emissions of energy production.

Land consumption still missing!

In addition to the external costs mentioned in Table 12, other externalities caused by transport can be identified, including soil and water pollution, up- and downstream emissions (e.g. emissions from the production, maintenance and disposal of vehicles), separation impacts in urban areas, etc. These externalities are briefly discussed in the Handbook, but are not considered in this report.

Van Essen, H., van Wijngaarden, L., Schroten, A., Sutter, D., Bieler, C., Maffii, S., Brambilla, M., Fiorello, D., Fermi, F., & Parolin, R. (2020). Handbook on the external costs of transport, version 2019.1. https://doi.org/http://doi.org/10.2832/27212

The main objective of a transport system is?

?

To transport people *(or goods)* *…* ***not cars*** *…*
in the most sustainable and efficient way,
in order to achieve good access
to necessary destinations

with a minimum of:

- ***costs, efforts, space requirement,***
- ***damage (environment, accidents, casualties).***

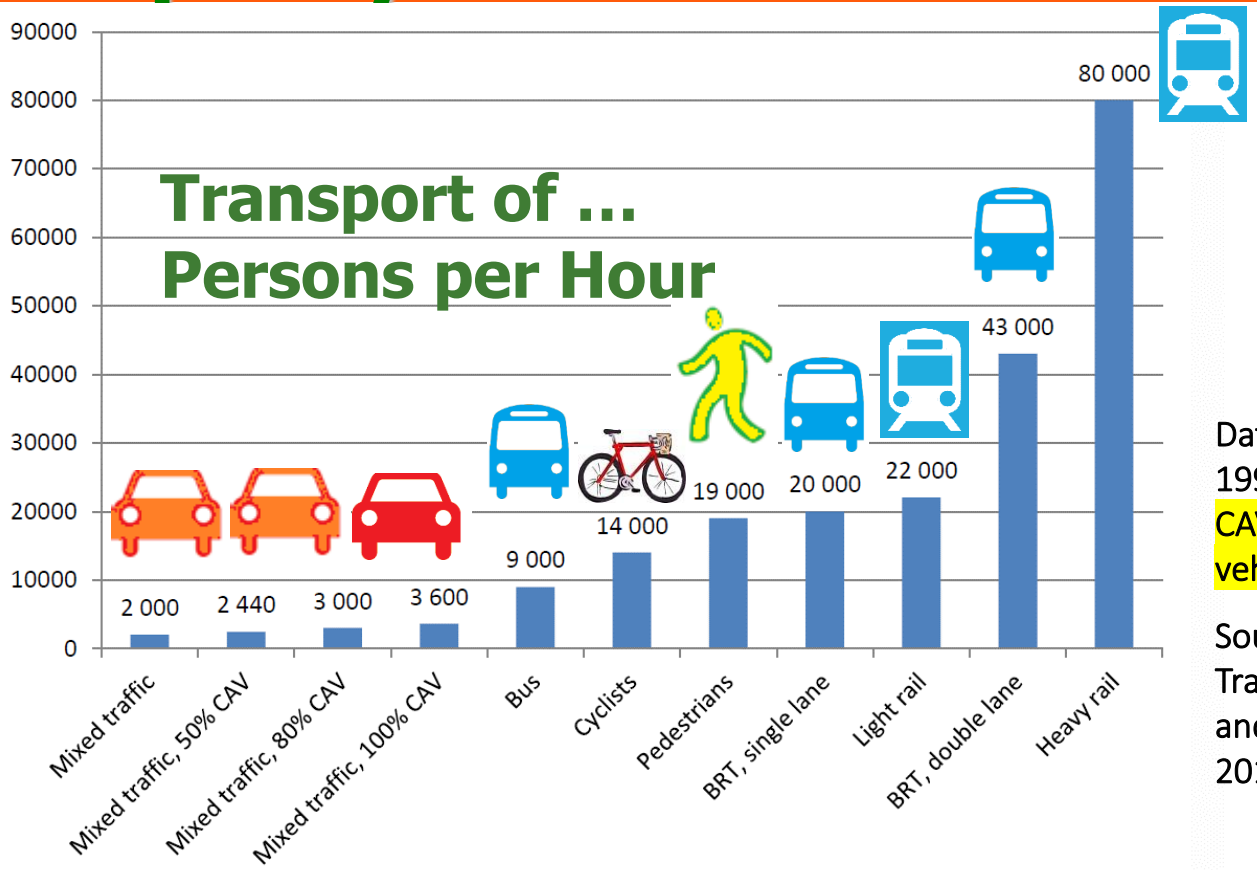
Space required to transport 60 People:

Car - traffic requires per person transported
10-times more space than all other modes!
(same goes for parking)

Car **Bus** **Bicycle**

Stadt Münster: Pressereferat

Capacity of a 3.5m wide Lane per Mode

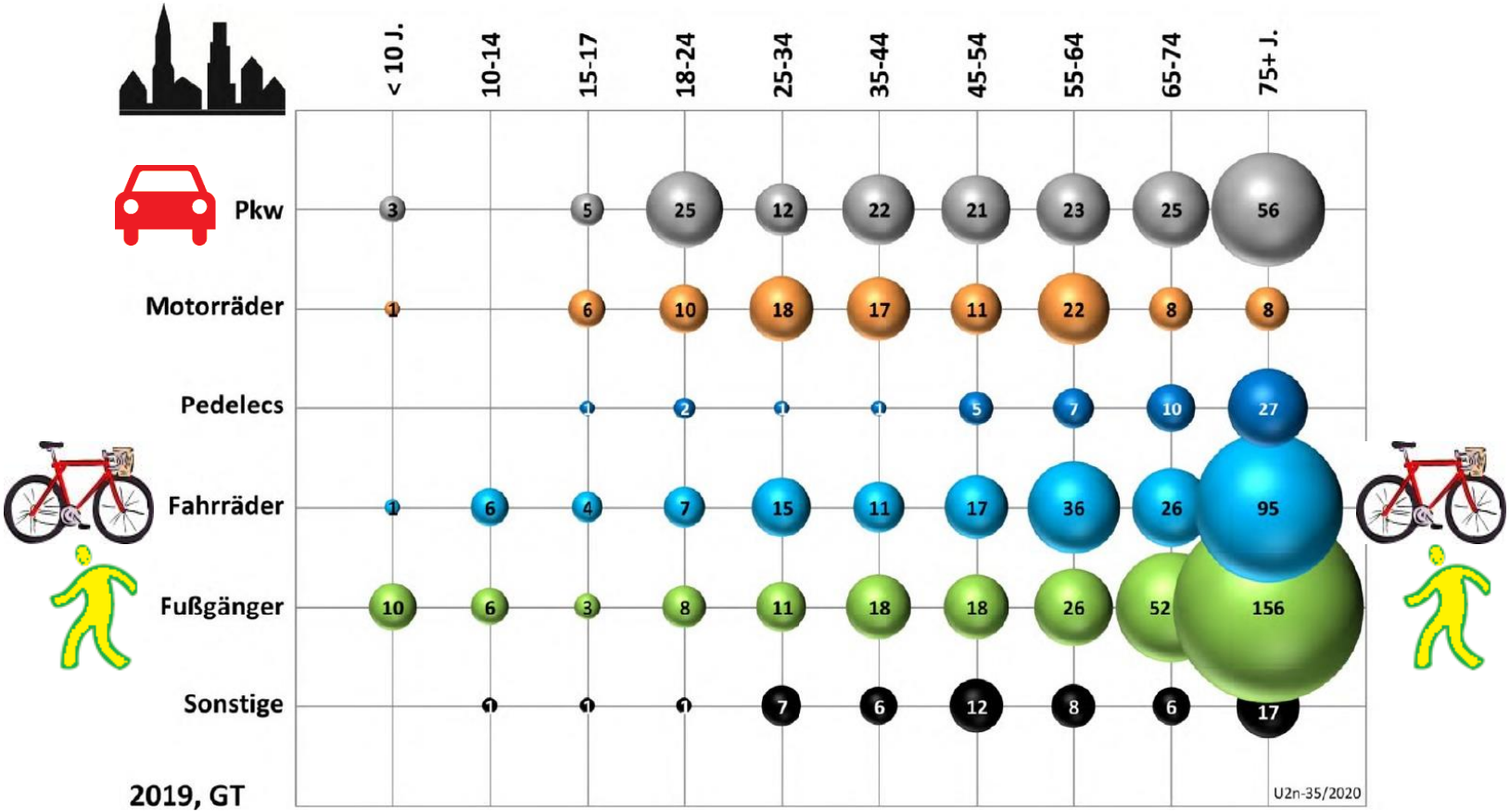


Data from Botma and Papandrecht 1991 and GIZ calculations 2009; CAV = connected and automated vehicles.

Source: Synergine for Auckland Transport 2015, adapted from ADB and GIZ 2011; Shladover, Su and Lu 2012.

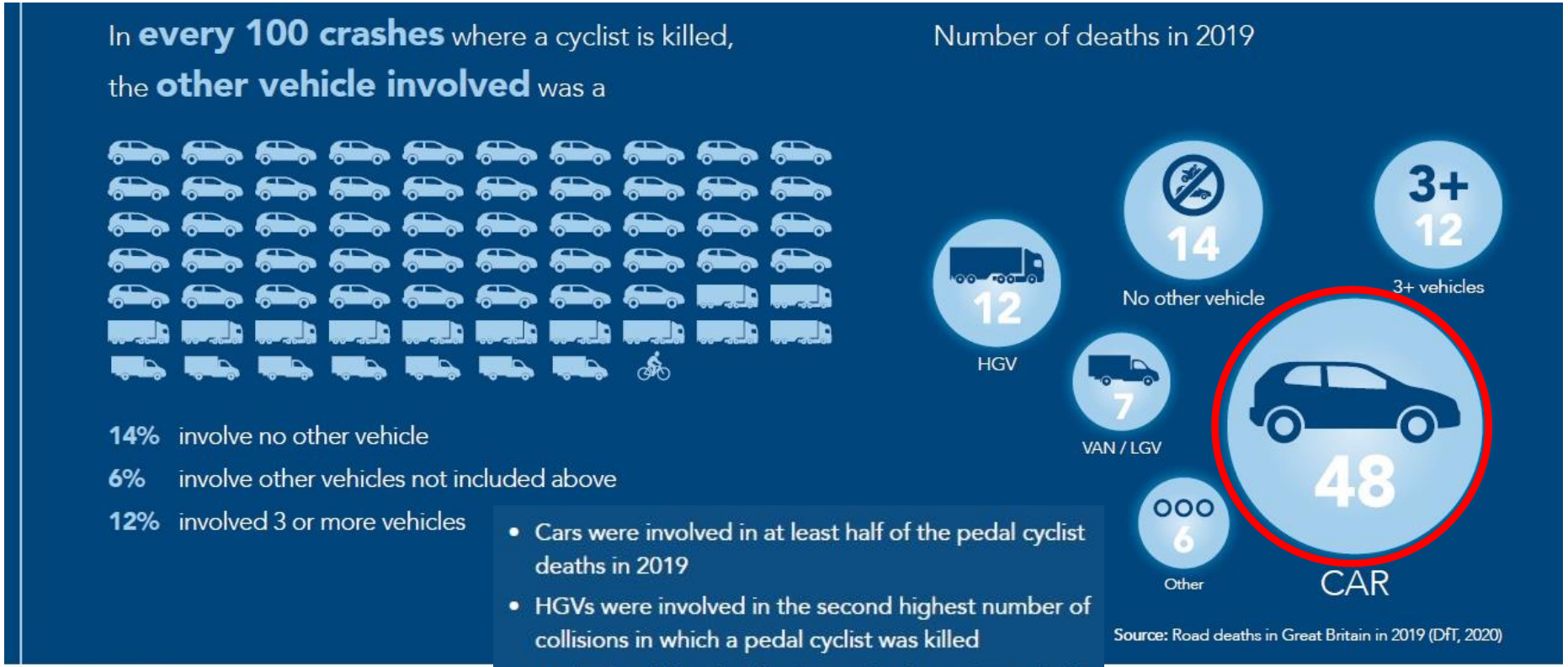
Veryard, D., & Perkins, S. (2018) Integrating Urban Public Transport Systems and Cycling; Summary and Conclusions. In: Vol. 166. Roundtable. Paris: OECD Publishing; OECD/ITF.

Casualties in built-up areas per transport mode (Germany, 2019)



Koßmann, I., & Schreck-von Below, B. (2021). Sicheres Radfahren in einem gemeinsam genutzten Straßenraum (Vol. Heft A 44). bast Bundesanstalt für Straßenwesen.

What kills cyclists? (Road deaths in Great Britain 2019)



Webster, E., & Davies, D. (2020). What Kills Most on the Roads (New Analysis for the New Transport Agenda, Issue.

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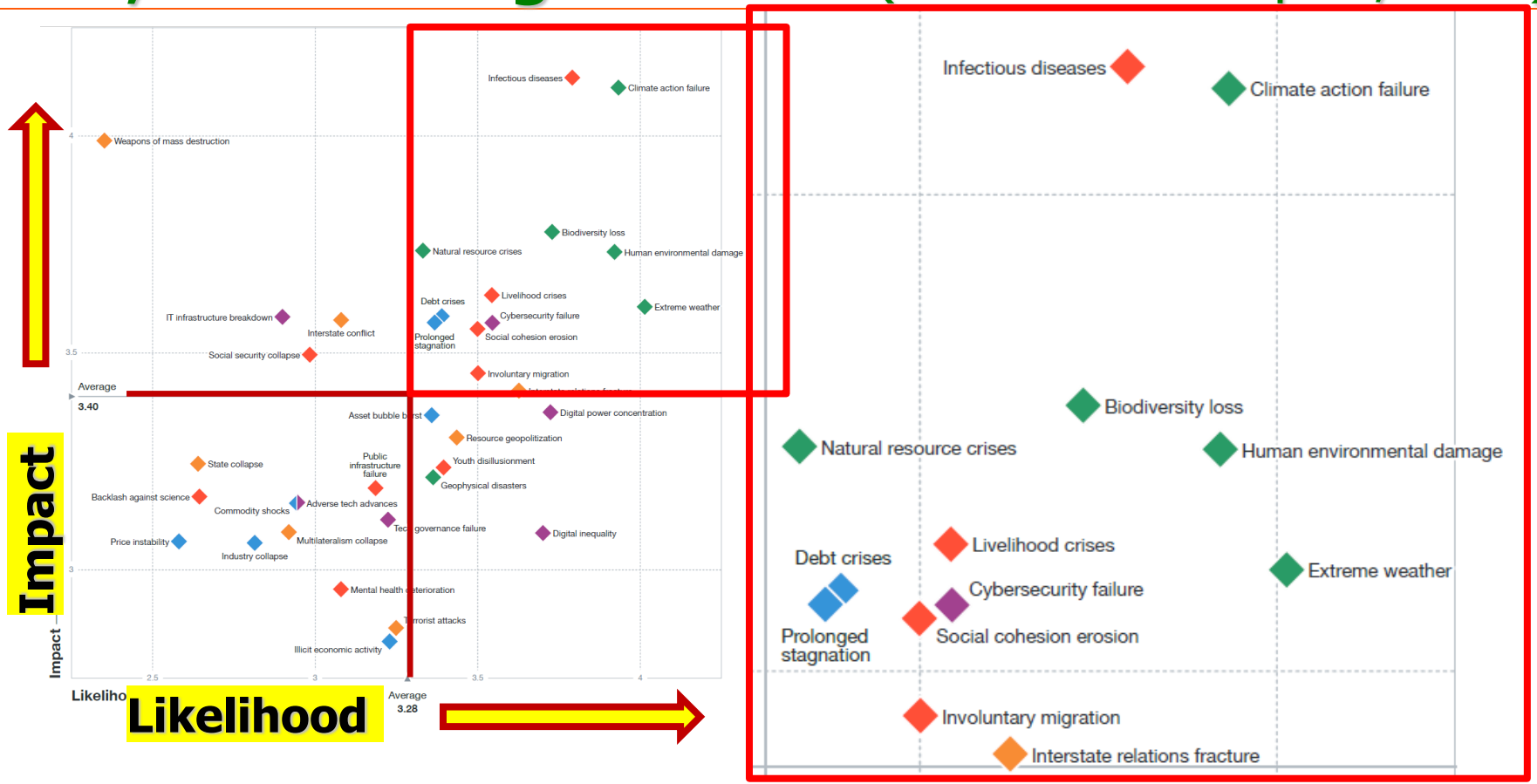
◄ Source: http://www.marcusgloger.de/

Risks, threatening mankind (Global Risks Report, 2021)



World Economic Forum. (2021). The Global Risks Report 2021, 16th Edition. https://www.weforum.org/reports/the-global-risks-report-2021

Promoting the Bicycle cuts costs in all "Community Problems"

Problem	Promoting Cycling achieves
Infrastructure, high **costs**: construction & maintenance poor cost-benefit ratios	Much **lower costs** – high benefits, high employment effect, **excellent cost-benefit ratios**
Scarcity of space (lanes, parking spaces etc.)	Less space needed (**1/10**), smaller / cheaper parking spaces
Health problems, lacking fitness, obesity etc., many sick leaves	More physical activity results in **improved health**, fitness, productivity, etc.
Traffic safety	Reduced accident costs
Poor **Qualitiy of life**, meagre attractiveness of public space	various, small-scale/detailed structures, good accessibility of POIs
negative **Environmental Impacts** (noise, PM, NO_x, **Climate,** etc.)	**Less Environmental Impacts, less CO_2**
Dependency on fossil fuels	By and large independent

Policies needed?

Motorised modes must pay their external costs;
Impose a tax on CO_2 (- equivalents = Climate costs).

Villages and cities must support active transport modes;
limiting speed to 30 kph on a general level is a quick start.

Car trips must be shifted towards Pedelecs
& combined with public transport.

Technology will not save us this time – we need to change our lifestyle towards more active mobility (walking, cycling).

Stop kidding – tell the people that we need to do this – NOW!

images: http://www.electrodrive-salzburg.at/

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Van Essen, H., van Wijngaarden, L., Schroten, A., Sutter, D., Bieler, C., Maffii, S., Brambilla, M., Fiorello, D., Fermi, F., & Parolin, R. (2020). Handbook on the external costs of transport, version 2019.1. https://doi.org/https://op.europa.eu/s/pLqH, http://doi.org/10.2832/27212

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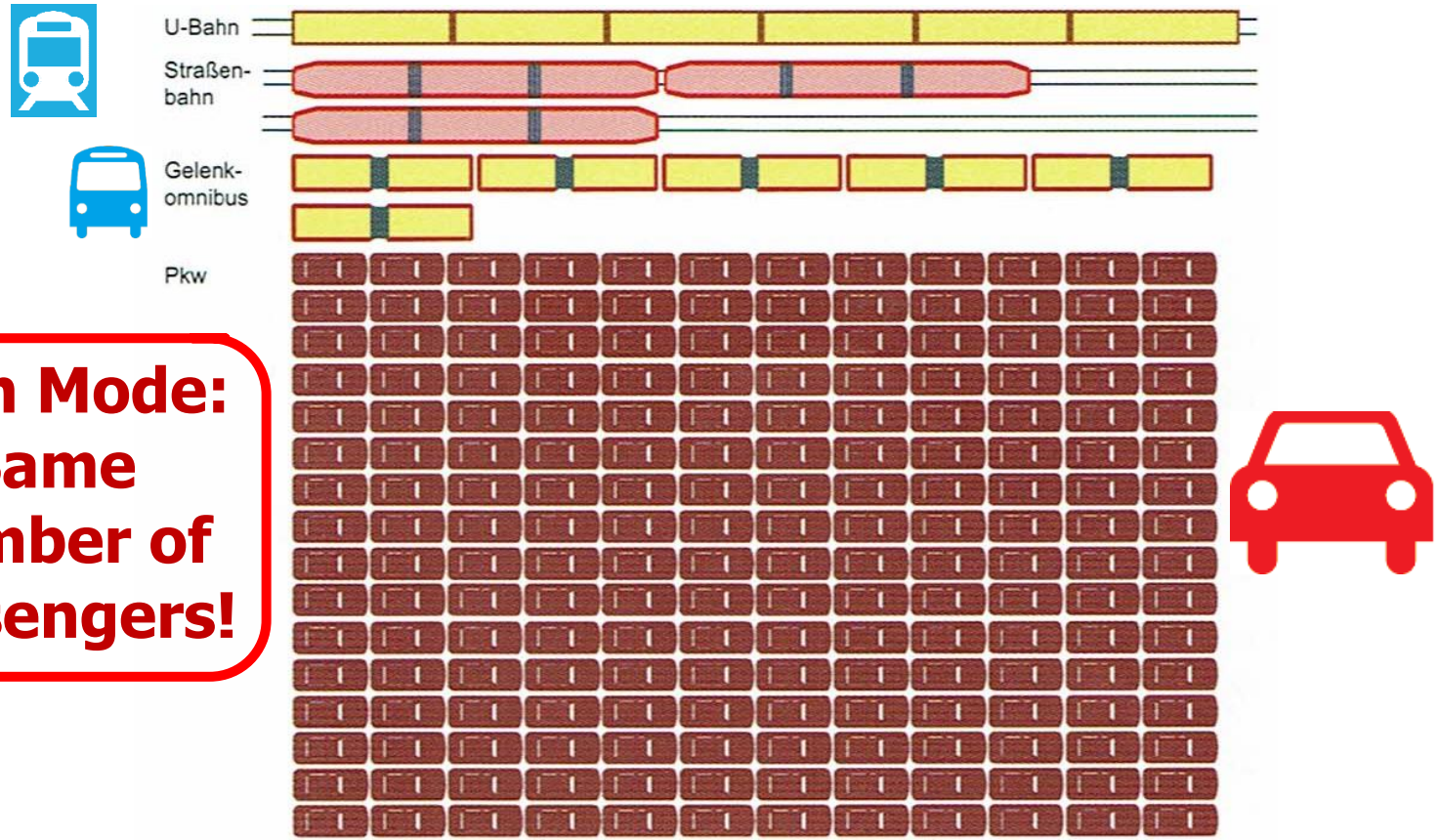
Space Consumption in Passenger Transport



Each Mode: Same number of passengers!

Bild 5: Vergleich der Flächeninanspruchnahme der Verkehrsmittel U-Bahn, Straßenbahn, Omnibus und Pkw bei gleicher Anzahl zu befördernder Personen und attraktiver Auslastung

Wolf, Johannes. (2020). Klimapolitik und Verkehr; Der steinige Weg zur vollständigen Elektrifizierung des öffentlichen Straßenpersonennahverkehrs (ÖSPV) als Beitrag zur Klimaneutralität. Verkehr und Technik, 73(06, 2020), 223.