

Climate Check – Decarbonization in Austrian Guidelines RVS /RVE

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FSV Austrian Research Association for Roads, Railways and Transport

- founded in 1950 as Association for Roads, part of ÖIAV
- located near Karlskirche in Vienna
- ~ 1.400 experts from administration, industry and science
- develop, document and communicate knowledge of design, construction and operation of roads, rail and transportation



FSV our main products

- **Guidelines** (Richtlinien), regulations (Vorschriften), information notes (Merkblätter) and **description of services** (Leistungsbeschreibung)
- Organization of **conferences**, seminars and lectures
- Issuing **product approvals**
- **Certification** of road safety inspectors (RSA/RSI)
- FSV Reader to access guidelines RVS/RVE

RVS RICHTLINIEN UND VORSCHRIFTEN
FÜR DAS STRABENWESEN

Version 50 | Stand 1. September 2023



FSV working groups



SUBGRADE



TUNNEL
CONSTRUCTION



BRIDGE DESIGN AND
CONSTRUCTION



ASPHALT ROADS



CONCRETE ROADS



ROAD PAVEMENT



AGGREGATES



TRANSPORTATION AND
ENVIRONMENT



FUNDAMENTALS OF
TRANSPORTATION



URBAN
TRANSPORTATION



PLANNING AND
TRAFFIC SAFETY



OPERATION OF ROADS,
ROAD EQUIPMENT



TENDERING PROCESS
FOR ENGINEERING
WORKS



RAILWAYS

Infrastructure already affected by climate change

- more frequent landslides and floodings



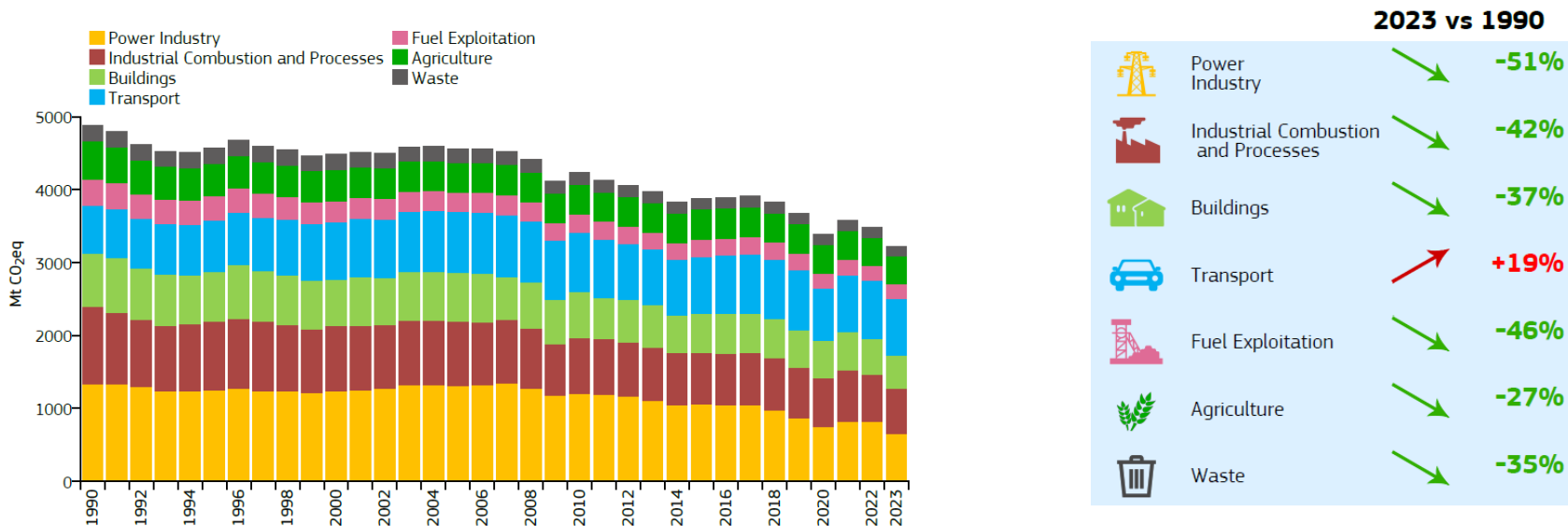
landslide A9, June 2024 (Asfinag)



flooding in Eastern Austria, station Tullnerfeld, Sep 2024 (ÖBB)

Green House Gas (GHG) emissions in the EU27

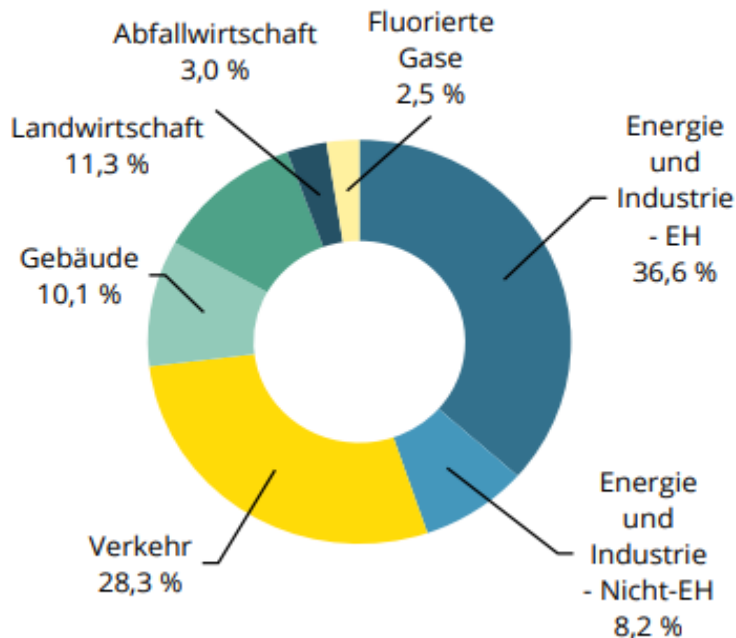
- in 2023 in EU27 3 200 Mt CO_{2eq}, worldwide 53 000 Mt, Austria 72 Mt CO_{2eq}
- only transport sector rises
- Green Deal EU climate neutral by 2050



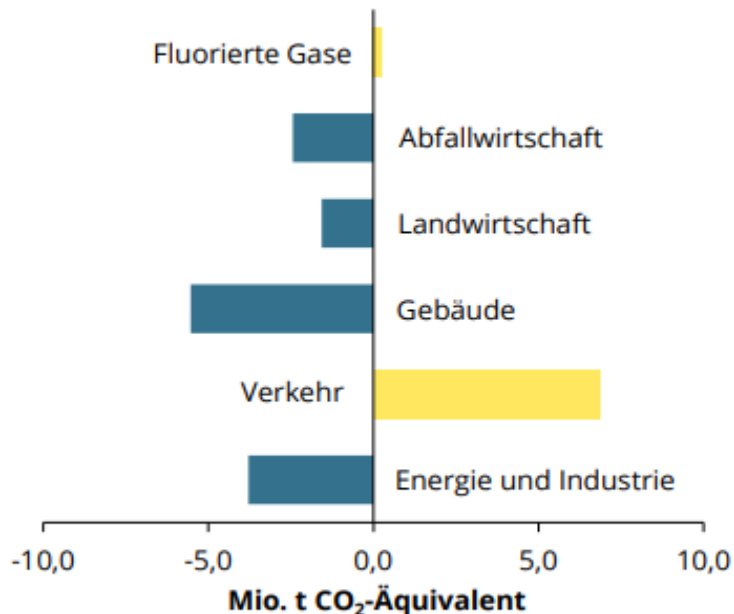
European Commission, Joint Research Centre, GHG Emissions of all world countries, 40020, 2024

Green House Gas (GHG) emissions in Austria

Anteil der Sektoren an den gesamten THG-Emissionen 2022



Änderung der Emissionen zwischen 1990 und 2022

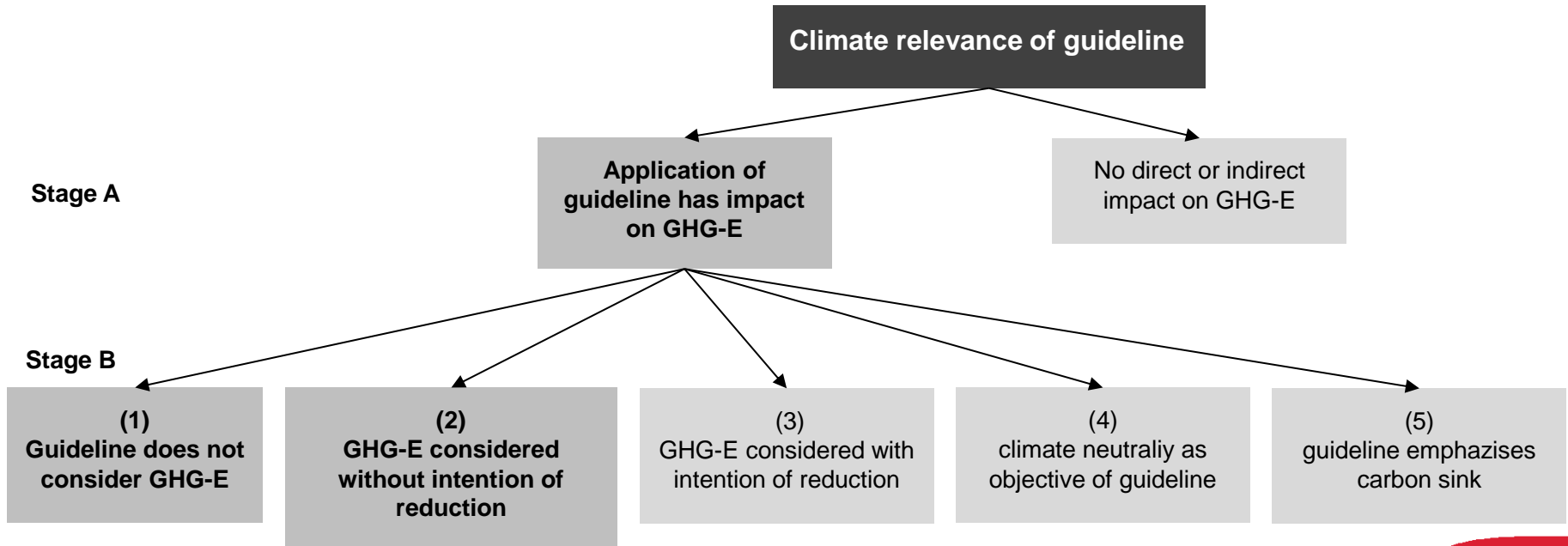


Quelle: Umweltbundesamt, 2024a.

umweltbundesamt[®]

FSV should assist to decarbonize transport

- in 2022 the FSV monitoring group on climate prepared recommendations
- investigation of RVS which require revision

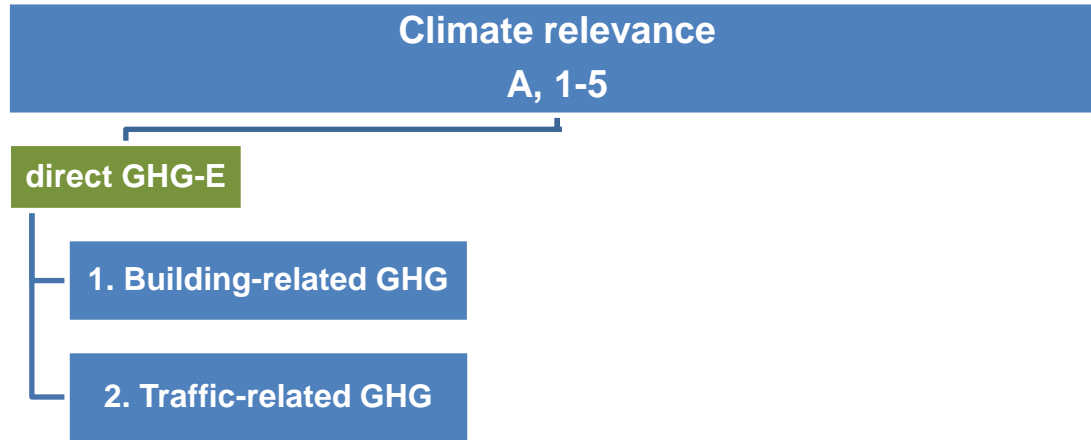


FSV Klimacheck

- launched in 2022 internal project
 - **identify criteria** to evaluate climate relevance
 - **check every RVS/RVE** according to these criteria
 - **prioritize** guidelines
 - **recommendations** how to proceed



Eight criteria to define climate relevance



Criteria 1: Building related GHG-E

- carbon footprint of buildings
 - raw materials like gravel, sand, cement, iron, carbon, bitumen, ...
 - **building material** like concrete, steel, asphalt mixtures, ...
 - **constructions** like bridges, tunnels, embankments, ...
- depends very much on local conditions
- measured as kg CO₂eq per weight or volume



Criteria 2: Traffic related GHG-E

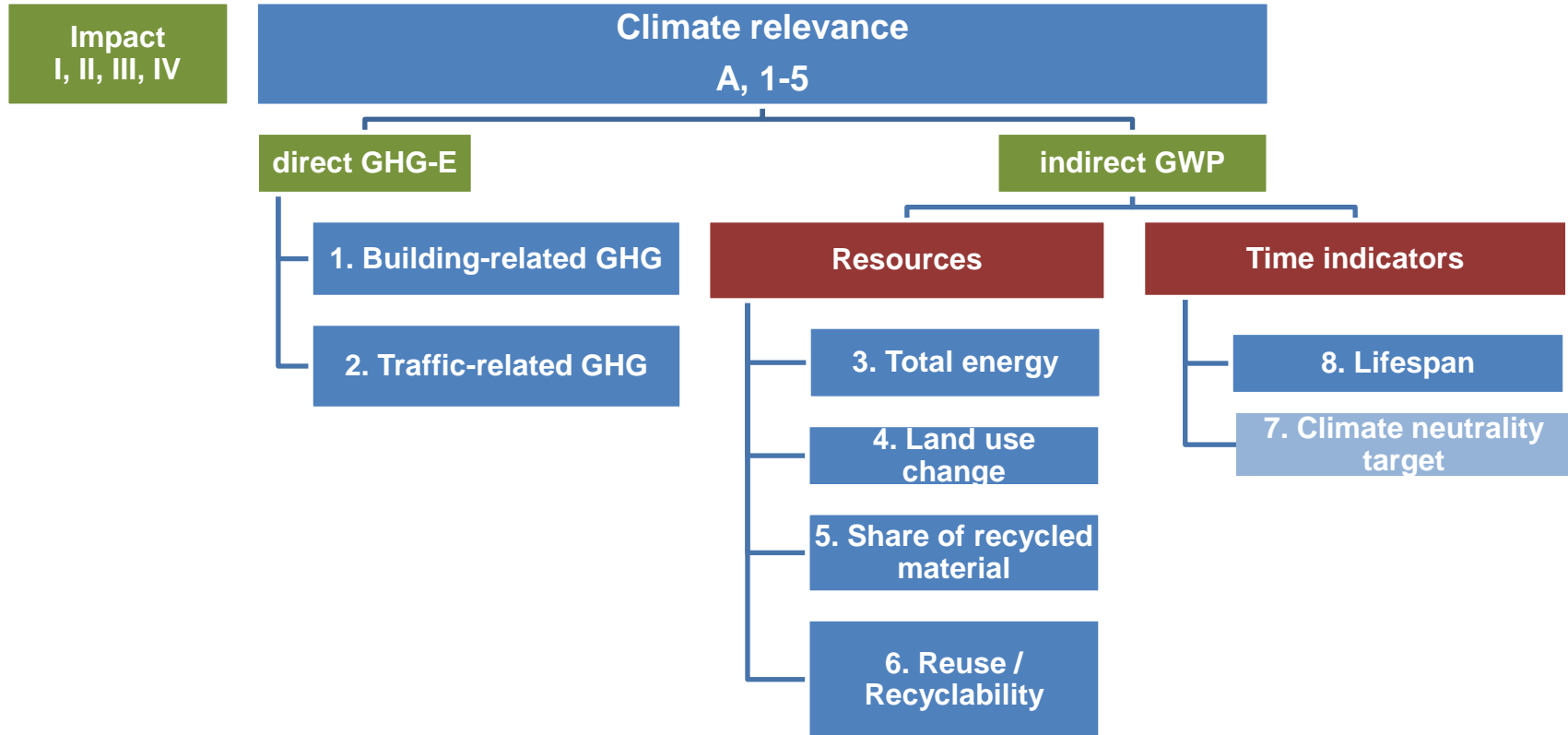
- carbon footprint of traffic performance
 - changes in road infrastructure will **influence travel demand**
 - primary and secondary **induced additional transport**
 - measures as kg CO₂eq per km by car and HGV (truck) and VMT (VehicleKm)

Traffic performance by persons and freight traveled in Austria per year

	1990		2019		2020		2021		2022	
	Mio PersKm/a	Mio tKm/a	Mio PersKm/a	Mio tKm/a	Mio PersKm/a	Mio tKm/a	Mio PersKm/a	Mio tKm/a	Mio PersKm/a	Mio tKm/a
Car / Road	54 600	22 400	74 600	60 700	69 700	59 800	70 800	64 900	71 400	64 400
Bus	5 500		8 800		7 100		7 400		7 200	
Rail	8 900	11 300	13 400	21 700	7 400	20 500	8 400	21 800	12 900	22 100

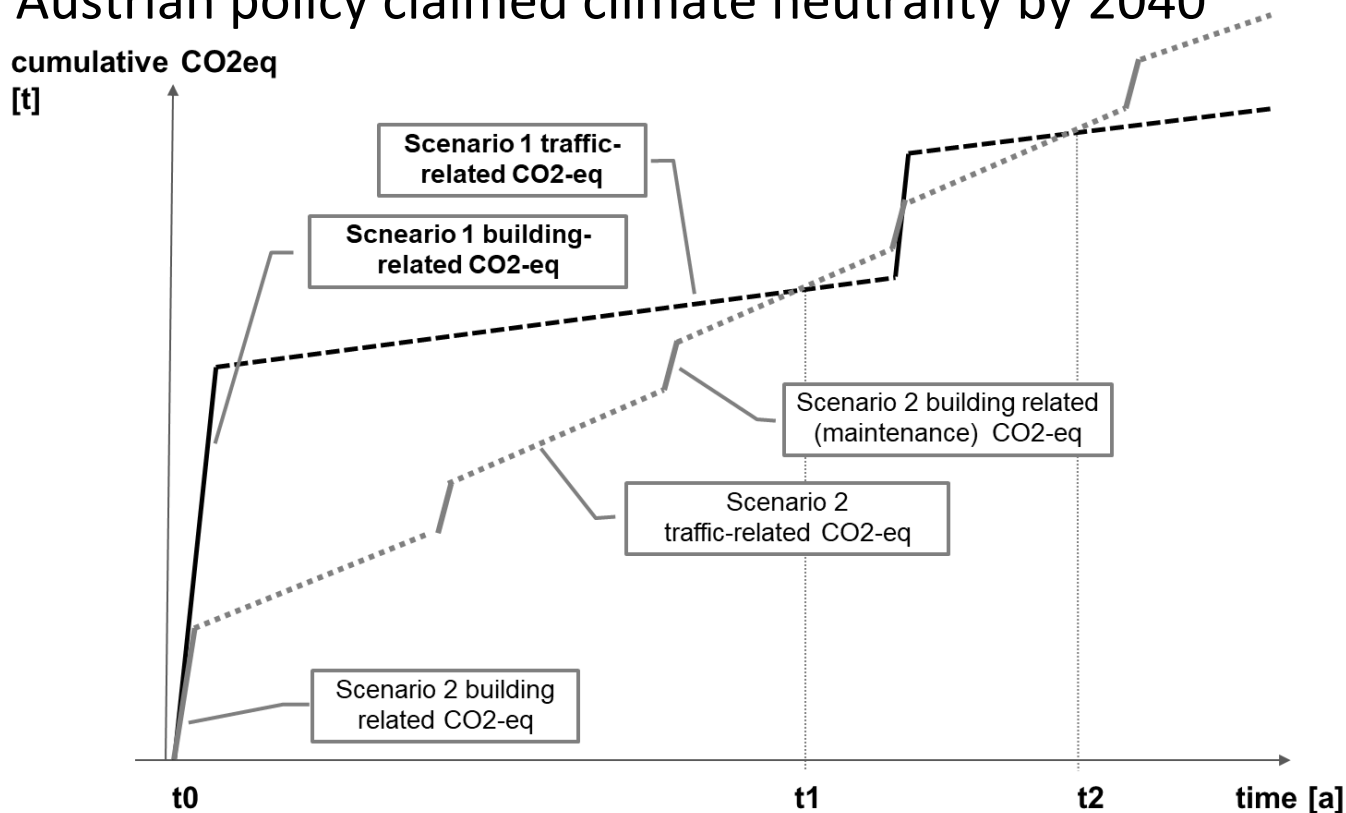
Data: UBA report 872, 2023

Eight criteria to define climate relevance



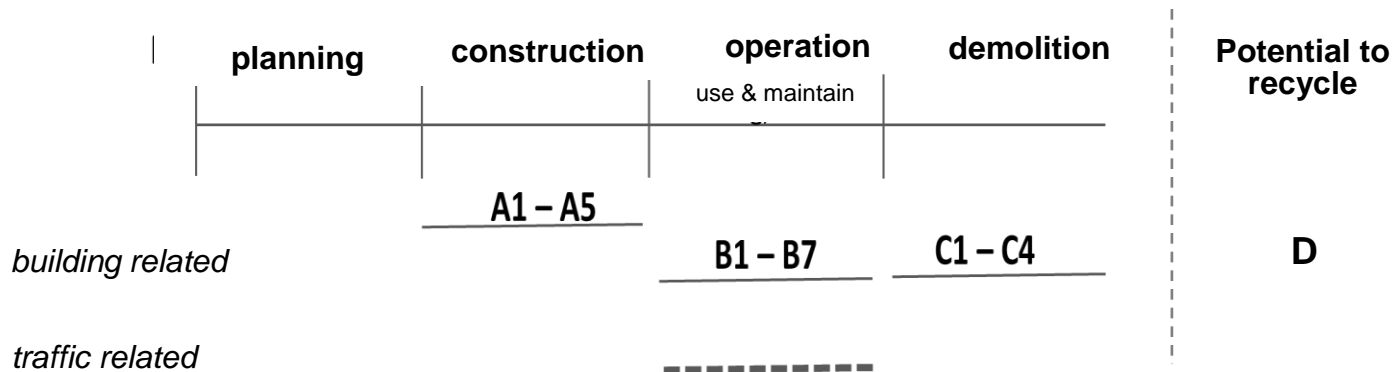
Criteria 7: Climate neutrality target

- Austrian policy claimed climate neutrality by 2040



Criteria 8: GHG-E over Life span

- all six criteria should be considered across life-span of construction (cradle-to-grave assessment, Life-Cycle-Assessment (LCA))
- difficult to handle in guideline; different lifetimes of constructions
- LCA guidelines and Environmental Product Declarations (EPDs): EN ISO 14040/44, EN 15804, EN 15643, EN 17472, EN ISO 14067

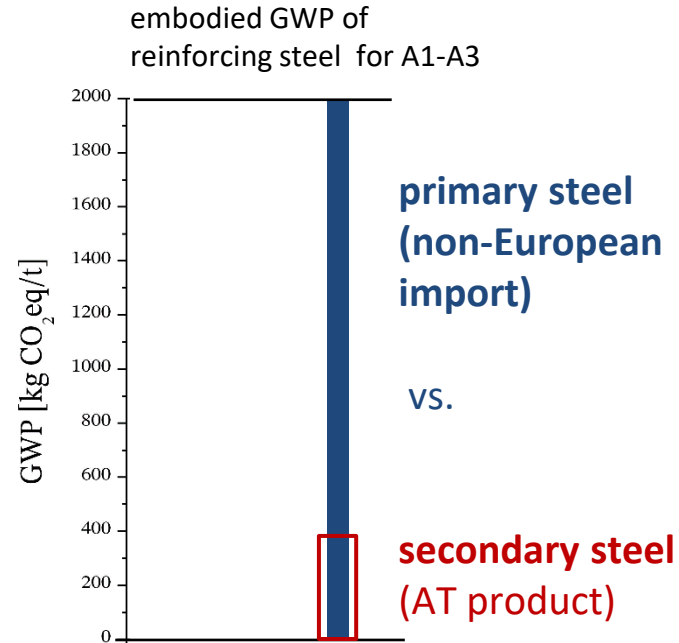


EPD - where to get them

- Environmental Product Declaration depends on product category
- standardized Product Category Rules (PCR) in EU, not worldwide
- EPDs depend on PCRs; EPD values partly depend on manufacturers info
- EPD values of building material highly regional dependent
- selected EPD databases for raw materials & building materials
 - CH https://www.kbob.admin.ch/kbob/de/home/themen-leistungen/nachhaltiges-bauen/oekobilanzdaten_baubereich.html
 - Ger <https://www.oekobaudat.de/>
 - AT database for concrete ÖBV <https://www.bau-epd.at/en/epd/list>
 - commercial: ecoinvent.org; spehre.com,
- EPD for construction elements (bridges, superstructure, embarkments, ...) <https://www.asfinag.net/dokumente/tphb/bau> → LCCO2

EPD - example reinforcing steel

- EPD of building material depends heavily on production location
- transport distance relevant because of weight and volume of building material



Juhart et al., Beton-Kalender 2023

Methodology: classification climate criteria

- for each RVS/RVE the climate criteria are classified
- criteria: direct GHG-E and indirect GWP

1 = very high need for action
Guideline does not consider GHG-E

2 = high need for action
GHG-E considered without intention of reduction

3 = need for action
GHG-E considered with intention of reduction

4 = little need for action
climate neutrality as objective of guideline

5 = no need for action
guideline emphasises carbon sink

A = no climate relevance, no GWP

Results: examples of three evaluations

- RVS 03.08.63 dimensioning of road superstructure (Oberbaubemessung)

building related GHG-E	traffic related GHG-E	total energy	land use change	recycled material	recyclability	Lifespan
1	1	1	A	2	1	2

- RVS 08.08.01 concrete and reinforced concrete (Beton und Stahlbeton)

building related GHG-E	traffic related GHG-E	total energy	land use change	recycled material	recyclability	Lifespan
1	A	1	A	1	1	1

- RVS 10.02.12 contract award criteria for public works (Zuschlagskriterien für Bauaufträge im Verkehrswegebau)

building related GHG-E	traffic related GHG-E	total energy	land use change	recycled material	recyclability	Lifespan
3	A	1	1	3	1	1

Methodology: rank guideline by relevance

assumption of the relevance of guideline
classified from

I (very important) to IV (irrelevant)

(H) frequency of application of guideline

(P) project size where guideline is applied
= invested money, volumes shifted

(V) changed traffic performance
= traffic affected by the project incl.
induced traffic

relevance	H	P	V
I	1	1	1
	1	1	0
	1	0	1
II	1	0,5	0
	1	0	0,5
	1	0,5	0,5
	0	1	1
	0	1	0
	0	0	1
III	1	0	0
IV	0	0	0

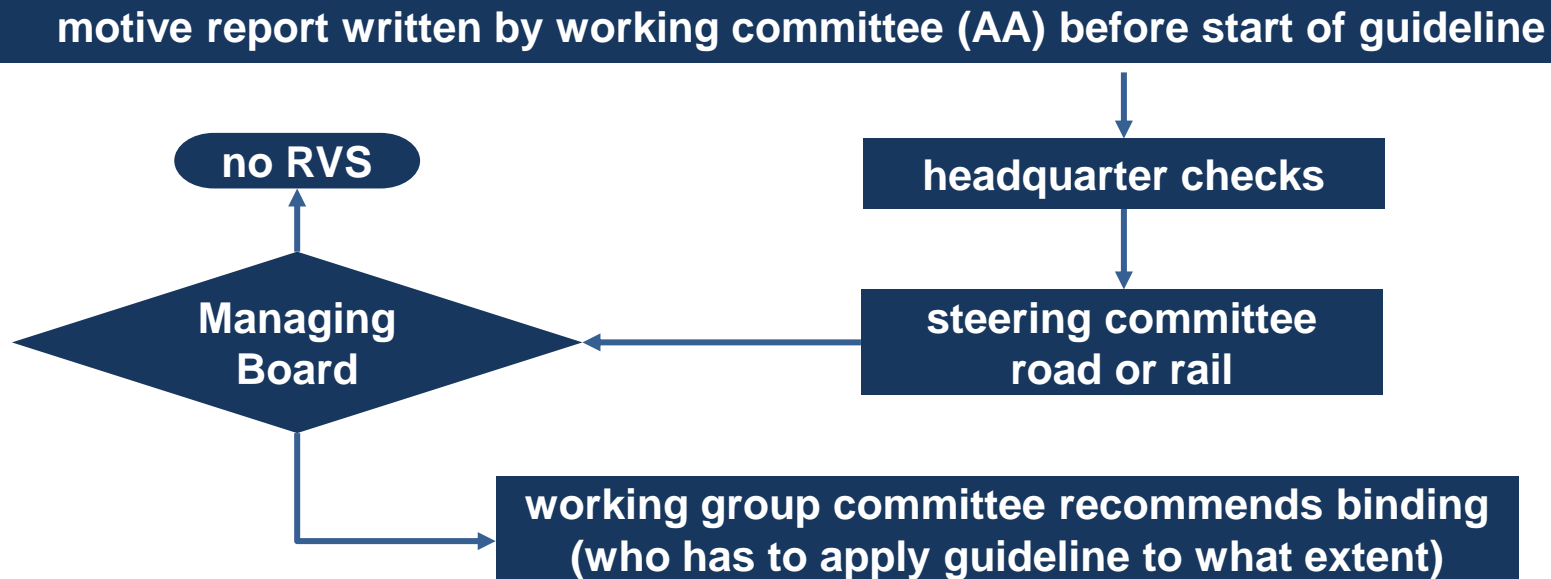
Results

- 147 out of 309 guidelines (RVS/RVE) are climate relevant
- 37 high priority because **climate relevant** and high **project relevance**

RVS 01.03.11	Gestaltung und Aufbau einer RVS	
RVS 02.01.11	Grundsätze der Verkehrsplanung	
RVS 02.01.22	Nutzen-Kosten-Untersuchung im Verkehrswesen	
RVS 03.01.11	Beurteilung des Verkehrsablaufs auf Straßen	
RVS 03.03.23	Linienführung und Trassierung	
RVS 03.03.31	Querschnittselemente sowie Verkehrs- und Lichtraum von Freilandstraßen	Cross-section Elements and Envelopes of Clearance of Rural Roads
RVS 03.03.81	Ländliche Straßen und Güterwege	
RVS 03.04.12	Planung und Entwurf von Innerortsstraßen	
RVS 03.05.13	Gemischte und planfreie Knoten	
RVS 03.08.63	Oberbaubemessung	
RVS 04.01.11	Umweltuntersuchung	Environmental Assessment
RVS 04.01.12	Umweltmaßnahmen	
RVS 04.02.12	Ausbreitung von Luftschadstoffen und Tunnelportalen	Dispersion of Airborne Pollutants from Transport Routes and Tunnel Portals
RVS 05.02.11	Anforderungen und Aufstellung	
RVS 05.04.31	Einsatzkriterien Verkehrslichtsignalanlagen	
RVS 05.04.32	Planen von Verkehrslichtsignalanlagen	
RVS 07	Leistungsbeschreibung	
RVS 08.03.01	Erdarbeiten	Earthworks

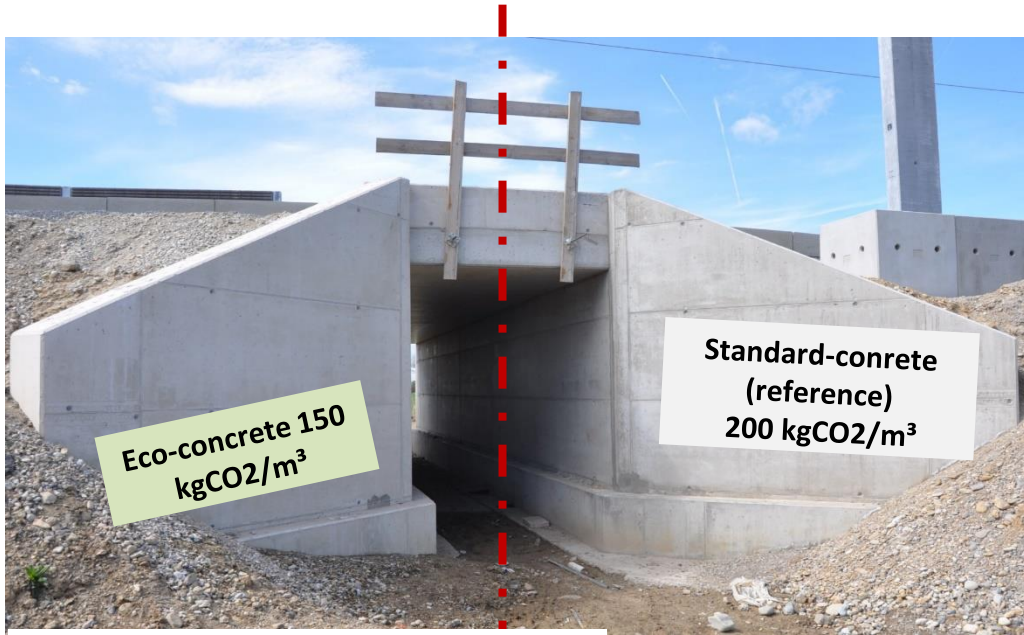
climate relevance required in new guidelines

- climate relevant criteria **newly in „motive report“**
(describes the objective and target group of a future guideline)

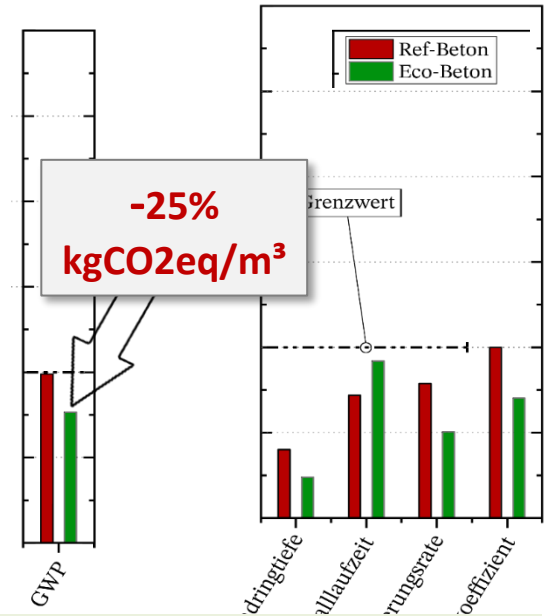


example ÖBB: GWP optimized construction

- passage for small animals built with 2 types of concrete



Juhart et al Beton- und Stahlbetonbau. 2022



Same functionality & durability (>100 years) + CO₂eq ↓

Conclusion

- GWP as core item to award an infrastructure project
- RVS/RVE have to contain guidance on GWP impact on constructions in planning, building and operation
 1. transport planning:CO2eq * traffic performance
 2. award and building: GHG-E should be an integral part in decision making
 3. EPD continuously to be updated