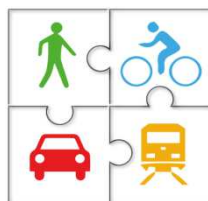# Vzdělávání mládeže k udržitelné dopravě
CZ.1.07/2.3.00/45.0020

Workshop k badatelsky orientované výuce v dopravě

Aktivita: KA3 Vzdělávání popularizátorů vědy

Ao. Prof.Dipl.Ing.Thomas Macoun Dr. tech.

5.2. 2015 OLOMOUC

Prof. Dr. Thomas Macoun
Institute of Transportation
Research Center of Transport Planning and Traffic Engineering
Vienna University of Technology
E-mail: thomas.macoun@tuwien.ac.at

Diploma :   City and Regional Planning,
PhD: Civil Engineering
MaS   Technical Protection of the Environment
Habilitation: Assessment of Measures in a Complex (Transport) Environment

- **Consulter for City and Regional Planning**
- committee leader of the **Austrian Research Community „road and traffic"**
- **Scientific officer of a number of projects of the European Union** (e.g. CRISP, BRIDGE, BEQUEST, INTELCITY) concerning the subjects traffic safety, quality of live and sustainability
- Member of PIARC (Technical Committee of the **World Road Organisation**)
- Olympic Games 2014, Coastal Master Plan" ,**Sochi,**
- Parking Organisation for the **City of Sochi**
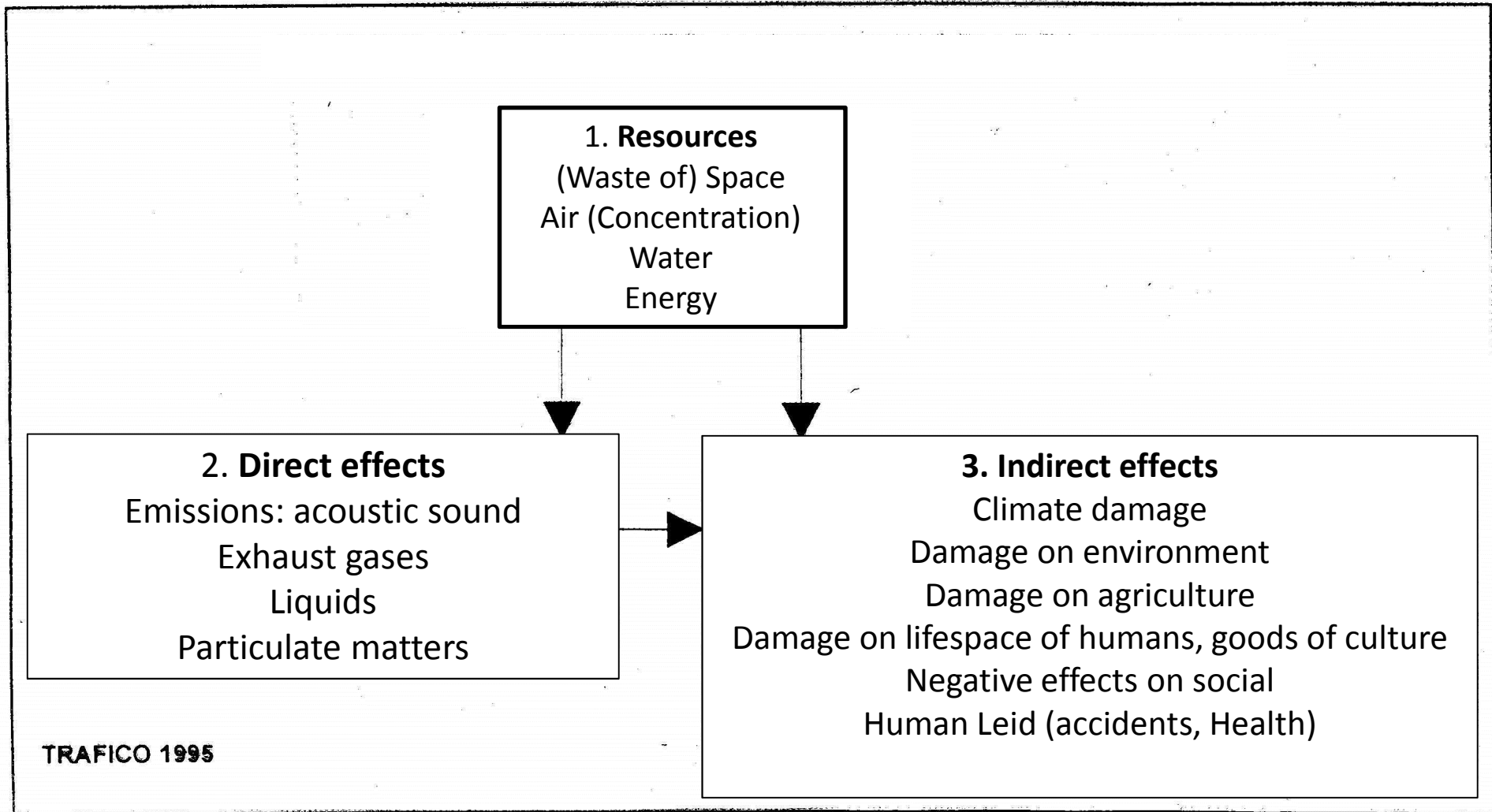- Member of the association of **Austrian scientists for Environmental Protection**

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

1. Resources
(Waste of) Space
Air (Concentration)
Water
Energy

2. Direct effects
Emissions: acoustic sound
Exhaust gases
Liquids
Particulate matters

3. Indirect effects
Climate damage
Damage on environment
Damage on agriculture
Damage on lifespace of humans, goods of culture
Negative effects on social
Human Leid (accidents, Health)

TRAFICO 1995

Dead people by……………per year

Traffic accidents — 1 Million (World Bank) to 1,2 Millionen (WHO 2003)

Smoke — 5 Millionen (WHO)

Passive smoking — 600.000 (WHO)

Suicide — 1 Million (WHO)

Noise — 210.000 (WHO) 3% of all deadly heart attacks and strokes

DETERMINANTS OF ROAD TRAFFIC MORTALITY

INDEPENDENT VARIABLES

EXPOSURE FACTORS

Vehicle density
Road density

RISK FACTORS, PREVENTIVE OR MODERATING MEASURES

Policies on specific interventions and their enforcement:
• alcohol
• speed
• investment in public transport

MITIGATING FACTORS

Strength of health system such as the presence of pre-hospital care, emergency care

INCOME

ROAD TRAFFIC MORTALITY (OUTCOME Yj)

http://www.zukunft-mobilitaet.net/3677/verkehrssicherheit/verkehrstote-weltweit-nach-laendern-uebersicht/
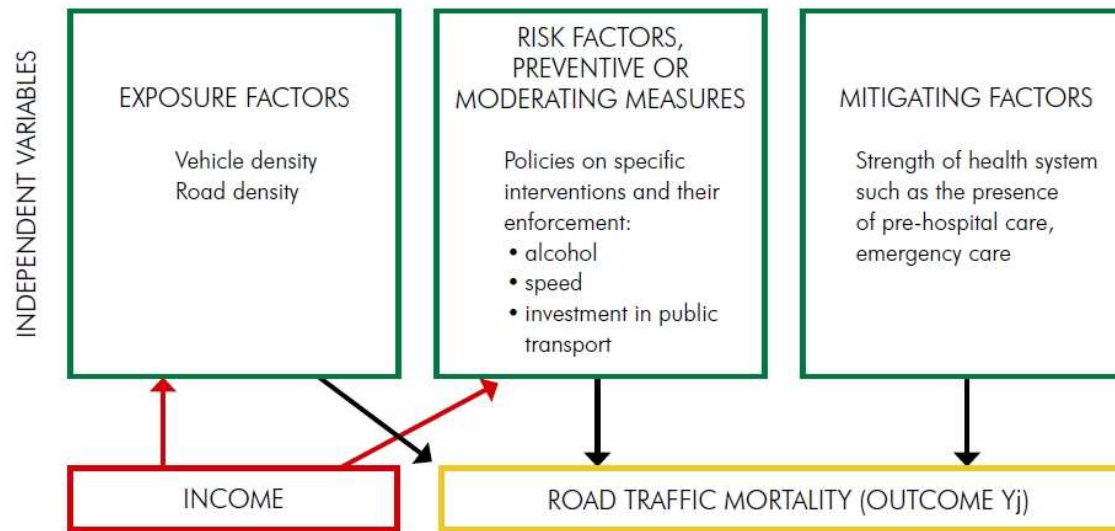
Causes of death	Cases of death (absolut)	Cases of death per 100.000 inhabitants
Traffic accidents	1,000.000 to 1,200.000	14,3 to 17,1
Smoke	5,000.000 to 6,000.000	71,4 to 85,7
Passive smoke	600.000	8,6
Suicide	1,000.000	14,3
Noise	210.000	3,0
Particulate matters	2,000.000	28,6
Exhaust gases	1,300.000	18,6
Cardiovascular disease	17,100.000	244,3
Cancer	7,600.000 to 8,000.000	108,6 to 114,3
Diabetes	1,300.000	18,6
Lack of exercise (inactivity)	5,300.000	75,7
Alcohol	2,500.000	35,7
Blood Pressure	9,000.000	128,6
Overweight	3,000.000	42,9
Lung disease	2,500.000 to 2,800.000	35,7 to 40
Cases of death (all Types)	56.260.000	803,7

World Population: 7.000.000.000

Austria: 600 (Traffic deaths/Year)
                  2400 (Death by exhaust gases)
                  1,3 Million sick days (exhaust gases)

German   particulate matters (WHO) 75.000 death
                  Soot in diesel exhasut gas, 14.000 death/year
                  (www.welt.de/print-welt/article 246107/)

Spain   20.000 premature deaths of air pollution

China   Traffic related Cancer
          2005:   126,0 von 100.000 (22,9% of all cause of deaths)
          2006:   144,6 von 100.000 (27,3% of all cause of deaths)
          yearly (!) 178.000 death by exhaust gases

Mexiko – City: 4000 death by Year (Q: International Council for clean Traffic)
Teheran: 4000 death by Year

PM$_{10}$ concentrations for major cities
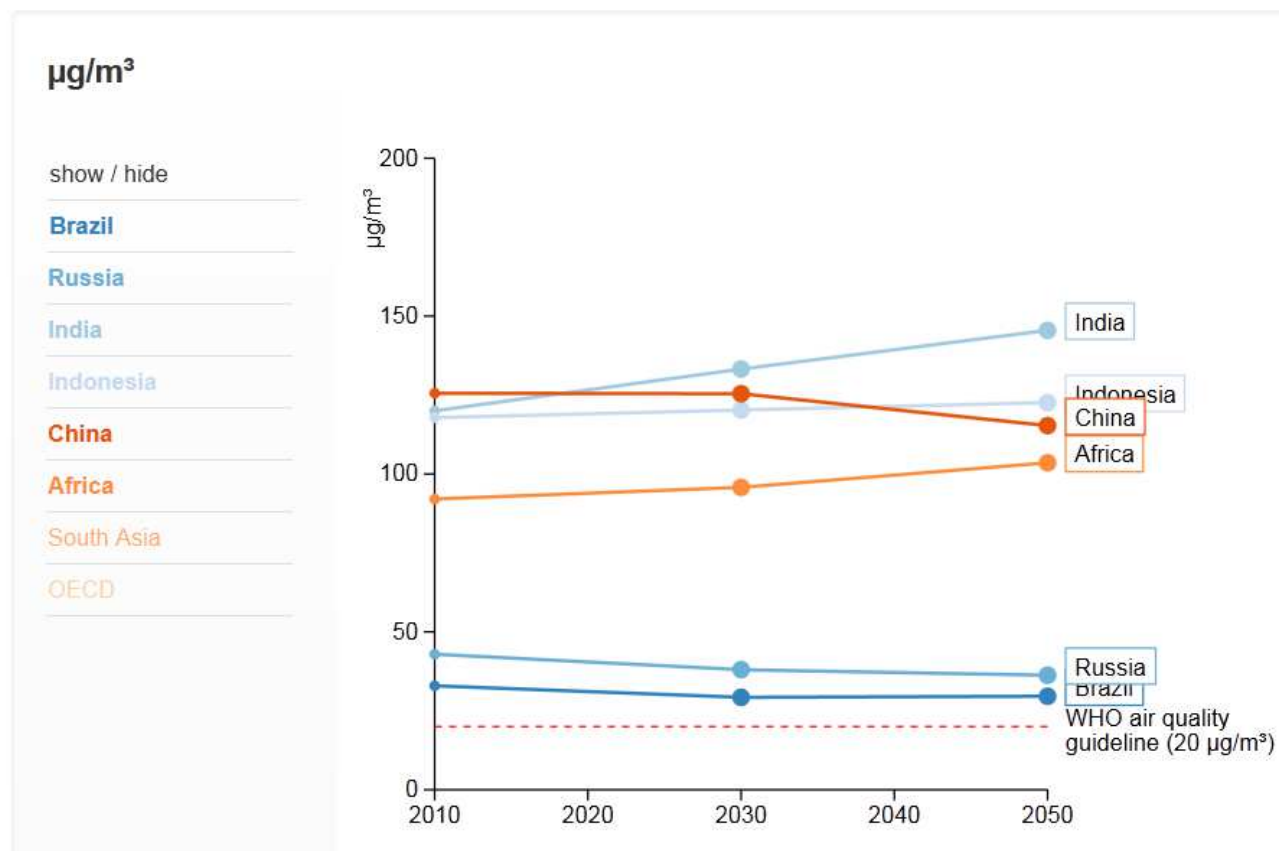
Source: (OECD, 2012), OECD Environmental Outlook to 2050; IMAGE model suite (PBL)

Data source: http://dx.doi.org/10.1787/env_outlook-2012-graph86-en

Executive Summary Chapter 6 , Key message

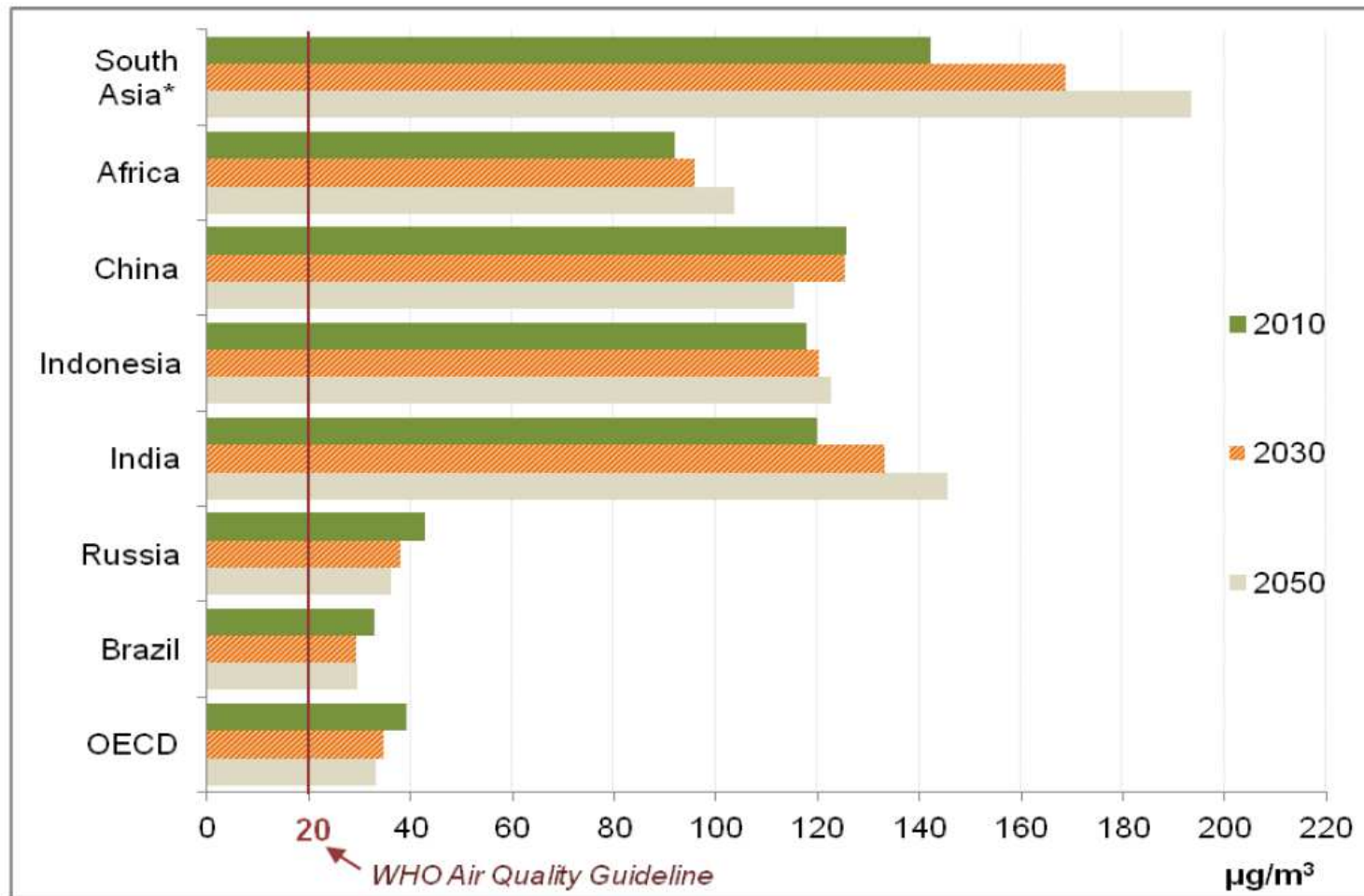Version 1 - Last updated: 26-Jan-2012

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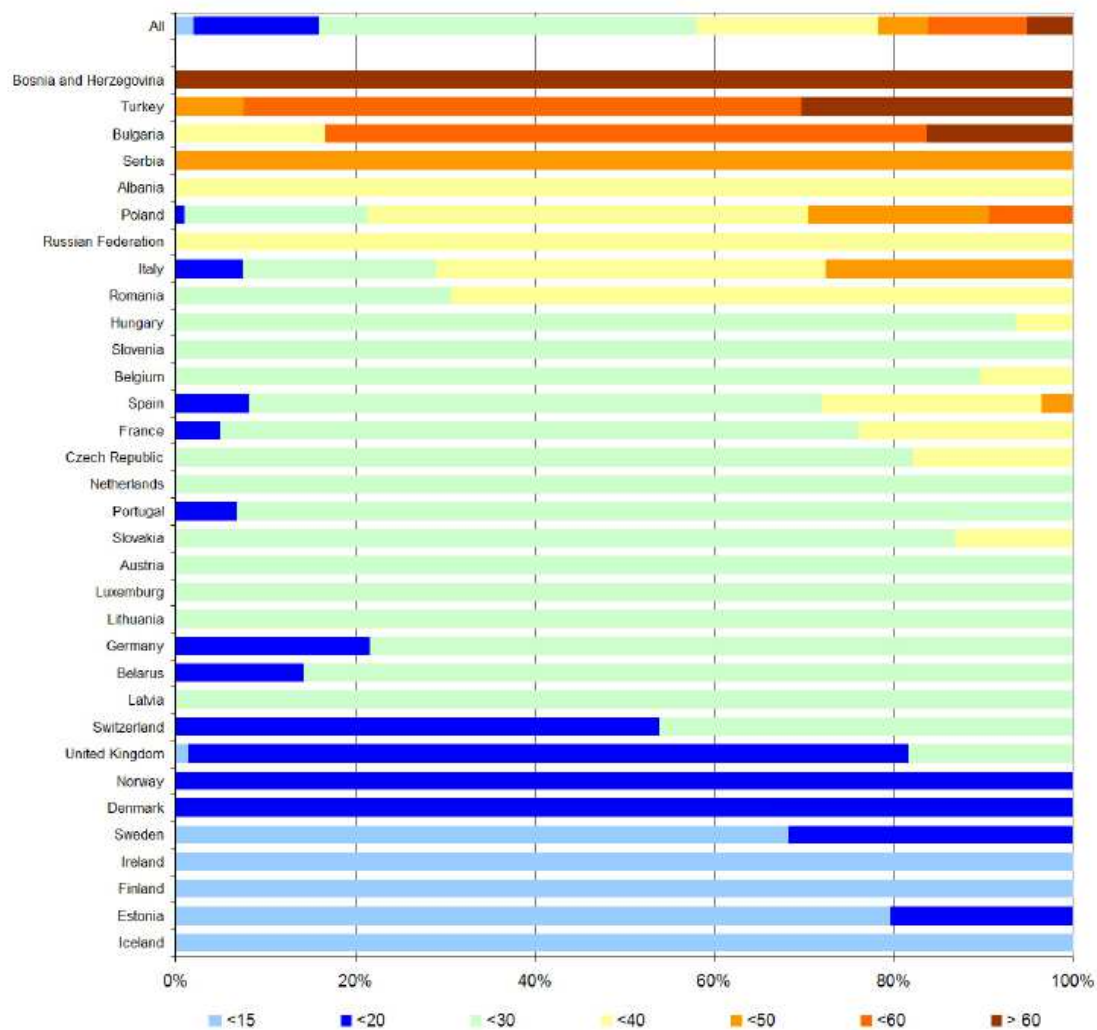
Note. In several countries the assessment is based on one city only.
Sources: AirBase for PM10 concentration data (2); HFA-DB (3) and Urban Audit (4) for city and country population data. For Belarus and Russian Federation, national data were used.

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Note: * The region South Asia excludes India.

Source: OECD Environmental Outlook Baseline; output from IMAGE.

New record of 728 µg/m³.
(US- Embassy in Peking)
In Peking the problem is called "Airpocalypse".

Measured values of the <u>Chinese Environmental Protection Autorities</u> (which are mostly lower) were increasing to a peak value of 456 µg/m³ for (small particulate 2,5 Mikrometer),

How bad this situation is shows a comparance with Austria. In Austria for particular matters a limit of 20 µg/m³ is valid, 50 µg/m³ is an alarm value.

Panel A. Total number of premature deaths

BRIICS= Brazil, Russia, India, Indonesia, China, South Africa
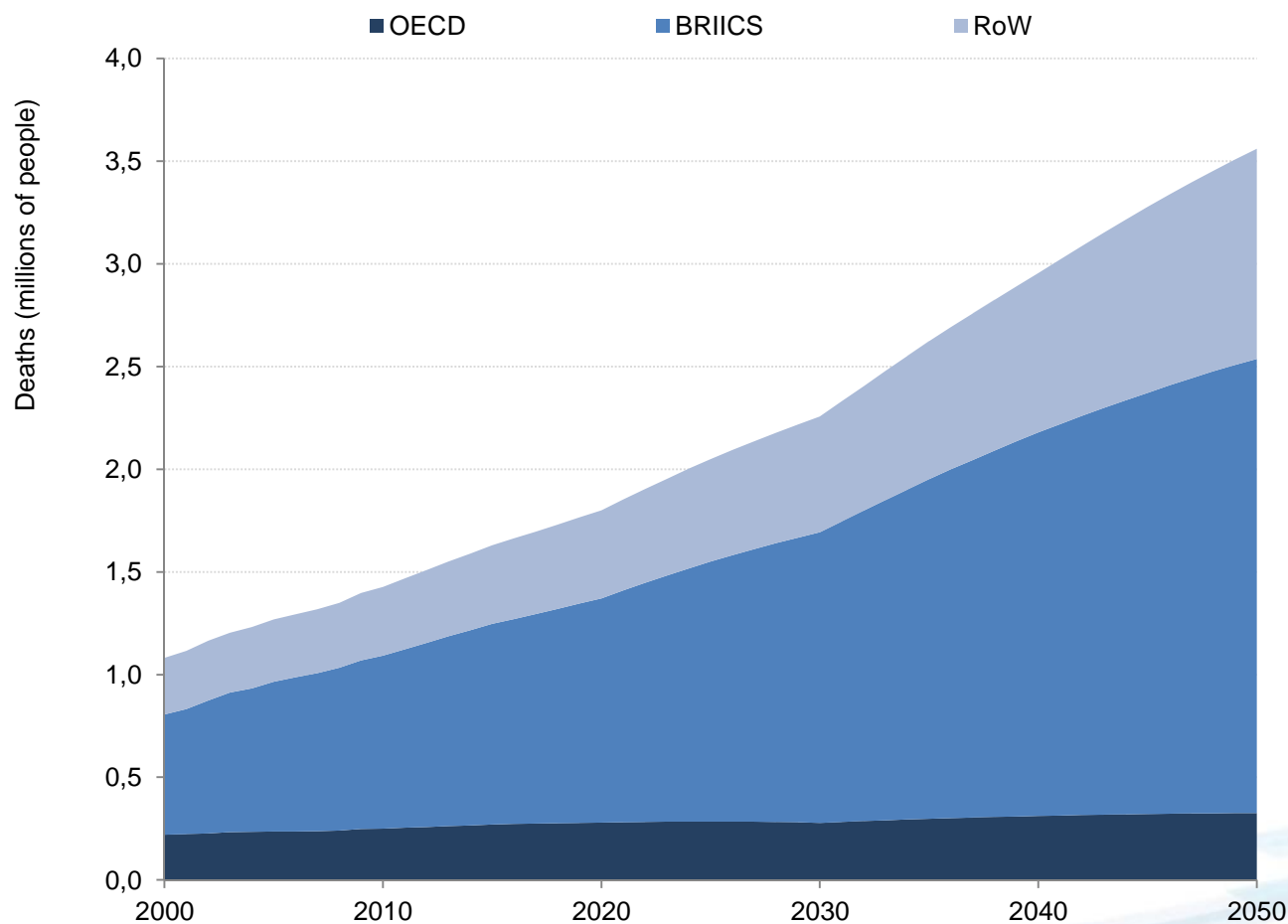
Source: OECD Environmental Outlook to 2050 - © OECD 2012;

Panel B. Number of deaths per million inhabitants
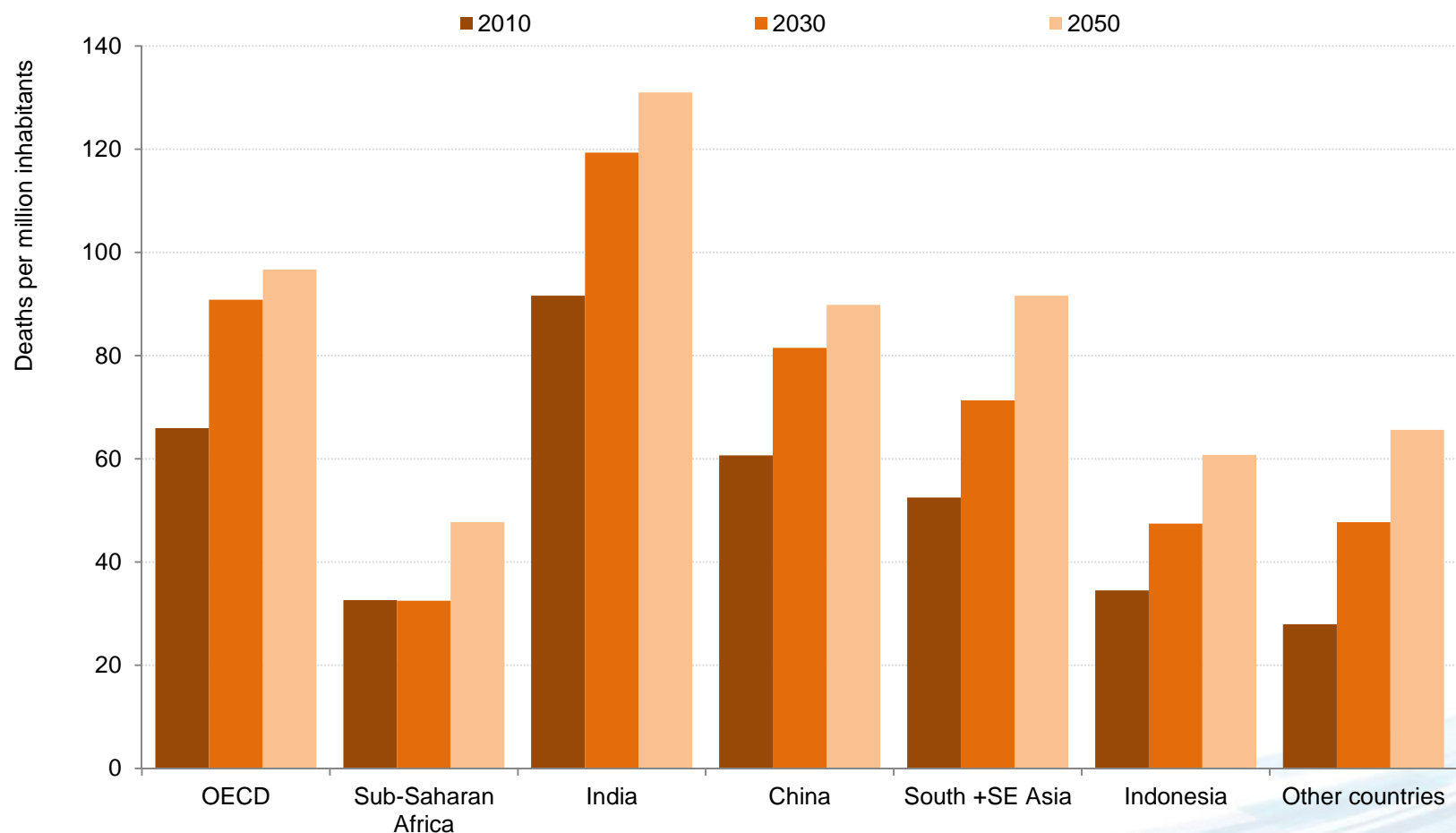
Note: The region South+SE Asia excludes India and Indonesia.

Source: OECD Environmental Outlook Baseline; output from IMAGE.
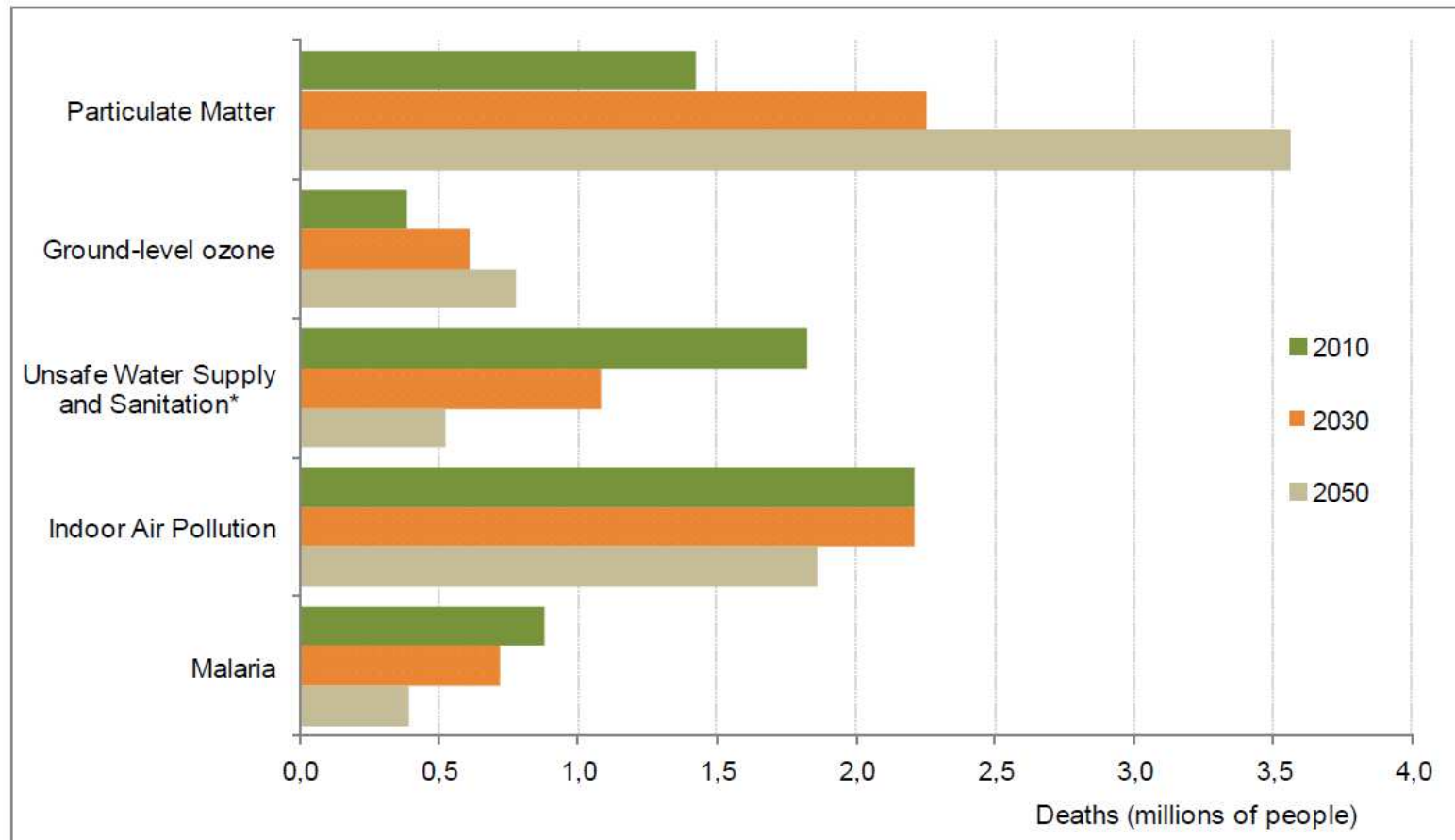
Note: * Child mortality only.

Source: OECD Environmental Outlook Baseline; output from IMAGE.

European Law Guidelines

- RL 96/62/EG „EU **Air Quality Frame** :n-RL
- RL 1999/30 EG „1. Daughter RL"
- RL 2000/79/EG „2 Daughter RL"
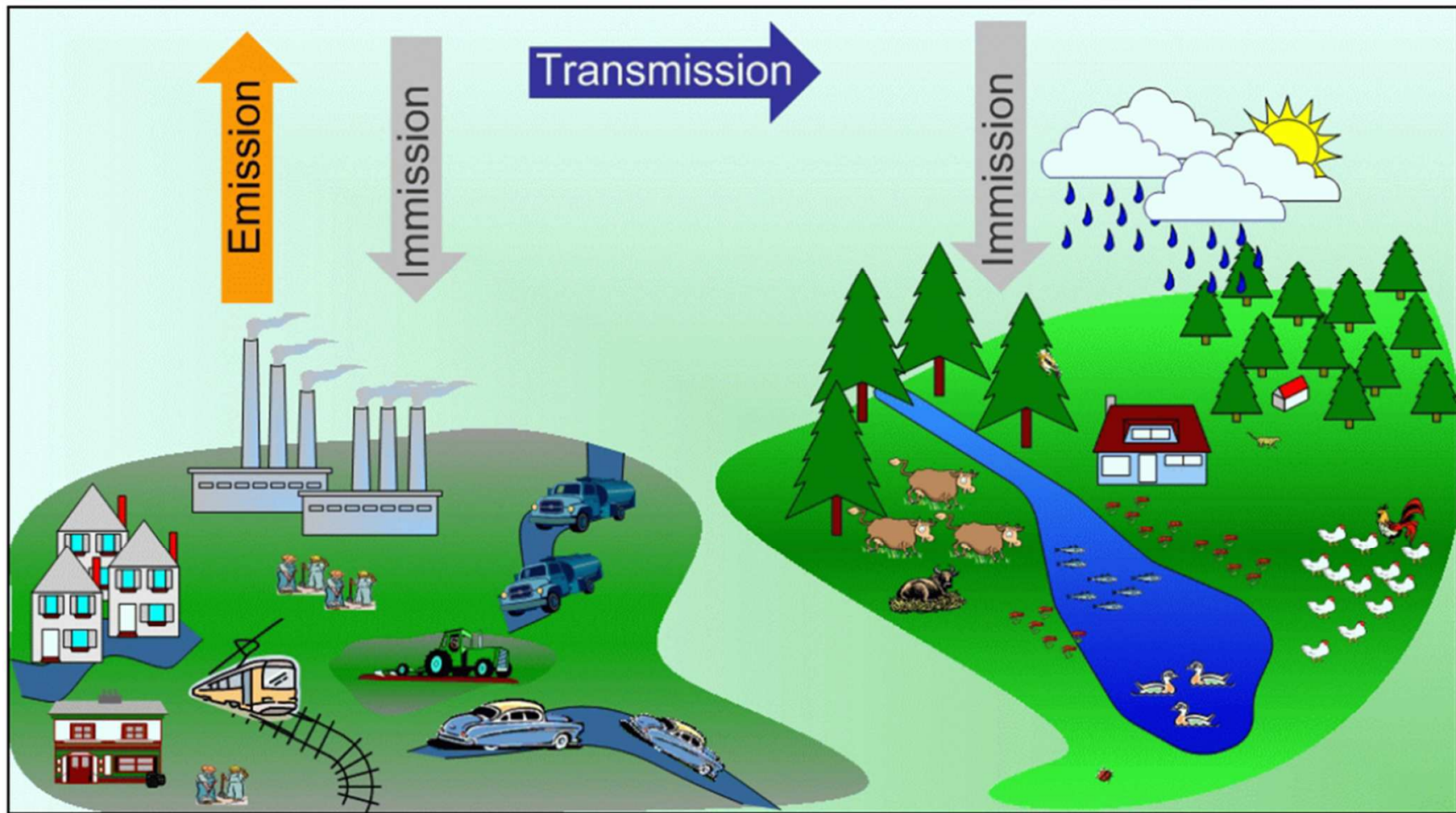- RL 2002/3/EG „3 Daughter RL"
- RL 2004/107/EG „4. Daughter RL"
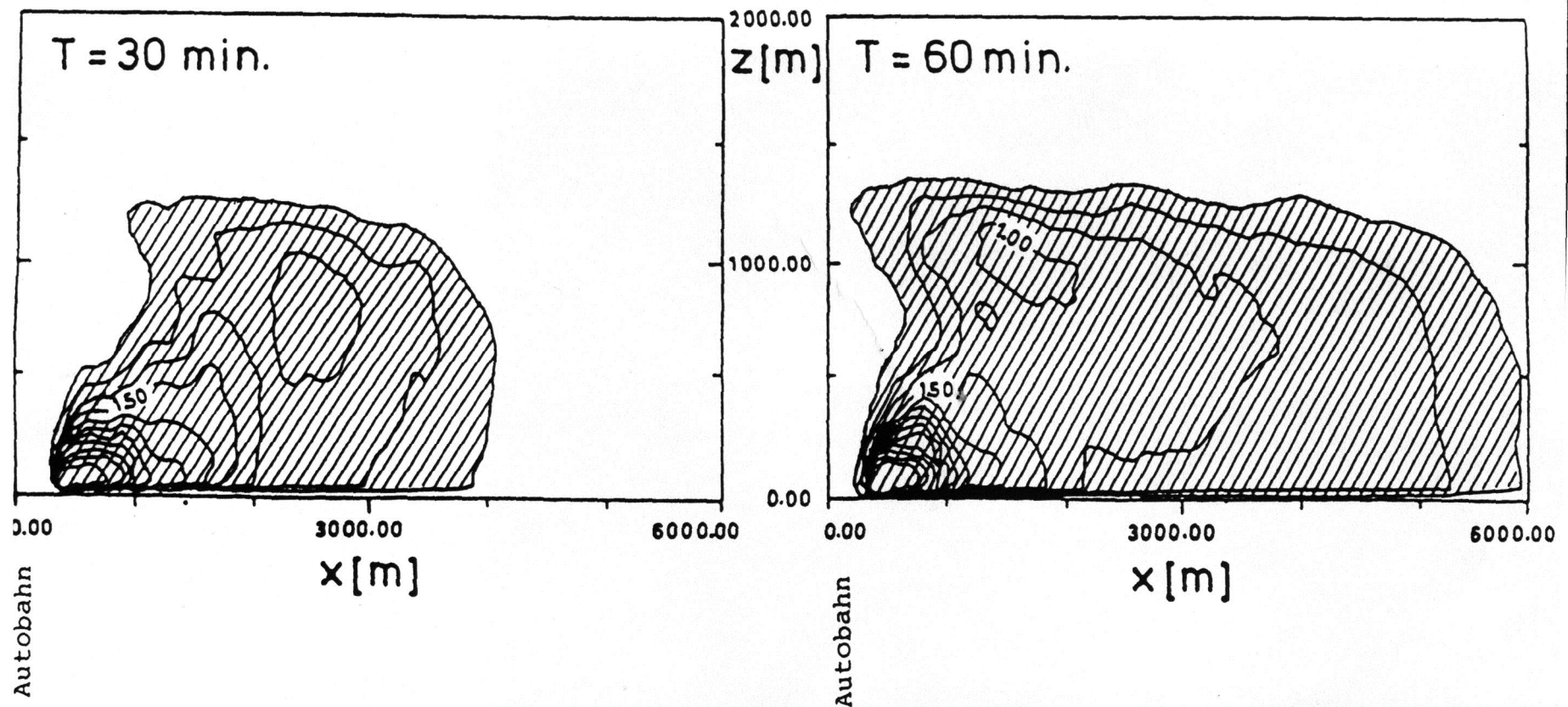
Implementation

IG-L   (IG – Air)

+ **Material Laws**   (UVP-G, GewO, AWG, MinroG)

IG-Air is the basis to implement eg. Low Emission Zones and Green Zones
In Berlin the Sooty particle emissions of traffic have been reduced by 24%, the Nitrogene oxide by 14%.

Schematic figure of relations between emission, transmission and immission
(Austrian Ministry of Environment)

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EFFECT	PM	HM	SO$_2$	NO$_x$	NMVOC	CO	CH$_4$	CO$_2$	N$_2$O
LOCAL									
air quality	████████████████████████████								
REGIONAL									
acidification			████████						
photochemical				████████████					
GLOBAL									
greenhouse effect					████████████████████████				

POLLUTANT

Carbonmonoxide
- general disorders (especially headache)
- Psychomotoric and psychic output losses
- Activator of Angina pectoris attacks at persons with impaired coronary circulation
- Risk factor for arteriosclerosis development

Nitrogene Oxide (NOx) und Photooxidantien (O3, PAN)
- Smell Nuisance
- Irritation of mucous membranes (eyes, nose, mouse, respirators system)
- General Complaint (especially Headache)
- Increase of Respiratory Resistance
- Release of asthma attacks

Hydrocarbons (CH)
- Aliphate/Olephine: No direct impacts at current concentrations, Hygienic importance with contribution of building of Photooxidantien
- Aldehyde/ Ketone: Smell nuisance (esp. "Diesel smell"; Irritation of mucous membranes (Formaldehyd!)
- Polycyclische Aromatische CH (PAH): animal experimental and epidemological proofed cancerogenity

Sooty particles

Predominantly serve as transport vehicle for absorbed pollutants; in the long run possible excessive demand of the lung cleaning capacity

Lead

Impacts on blood forming systems beginning with ab 20µg/100ml
Impact on metabolic system (Vitamins)
Neurophysiologic effects especially infants and schoolchilds
High blood pressure and changes of kidneys

Benzol/ Toluol/ Xylol (BTX)

Benzol is experimental and epidemologic known as carcinogen
Toluol/Xylol have impacts on the central nervous system

Asbestos

Strongly effective Carcinogen (Pleuramesotheliome, Lung und Stomach)

Quelle: Lercher

Pollutant	Effects related to short-term exposure	Effects related to long-term exposure
Particulate matter	• Lung inflammatory reactions • Respiratory symptoms • Adverse effects on the cardiovascular system • Increase in medication usage • Increase in hospital admissions • Increase in mortality	• Increase in lower respiratory symptoms • Reduction in lung function in children • Increase in chronic obstructive pulmonary disease • Reduction in lung function in adults • Reduction in life expectancy, owing mainly to cardiopulmonary mortality and probably to lung cancer
Ozone	• Adverse effects on pulmonary function • Lung inflammatory reactions • Adverse effects on respiratory symptoms • Increase in medication usage • Increase in hospital admissions • Increase in mortality	• Reduction in lung function development
Nitrogen dioxide[a]	• Effects on pulmonary function, particularly in asthmatics • Increase in airway allergic inflammatory reactions • Increase in hospital admissions • Increase in mortality	• Reduction in lung function • Increased probability of respiratory symptoms

[a] In ambient air, nitrogen dioxide serves as an indicator for a complex mixture of mainly traffic-related air pollution.

Irritant gases

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Source: Niederösterreichische Krankenkasse
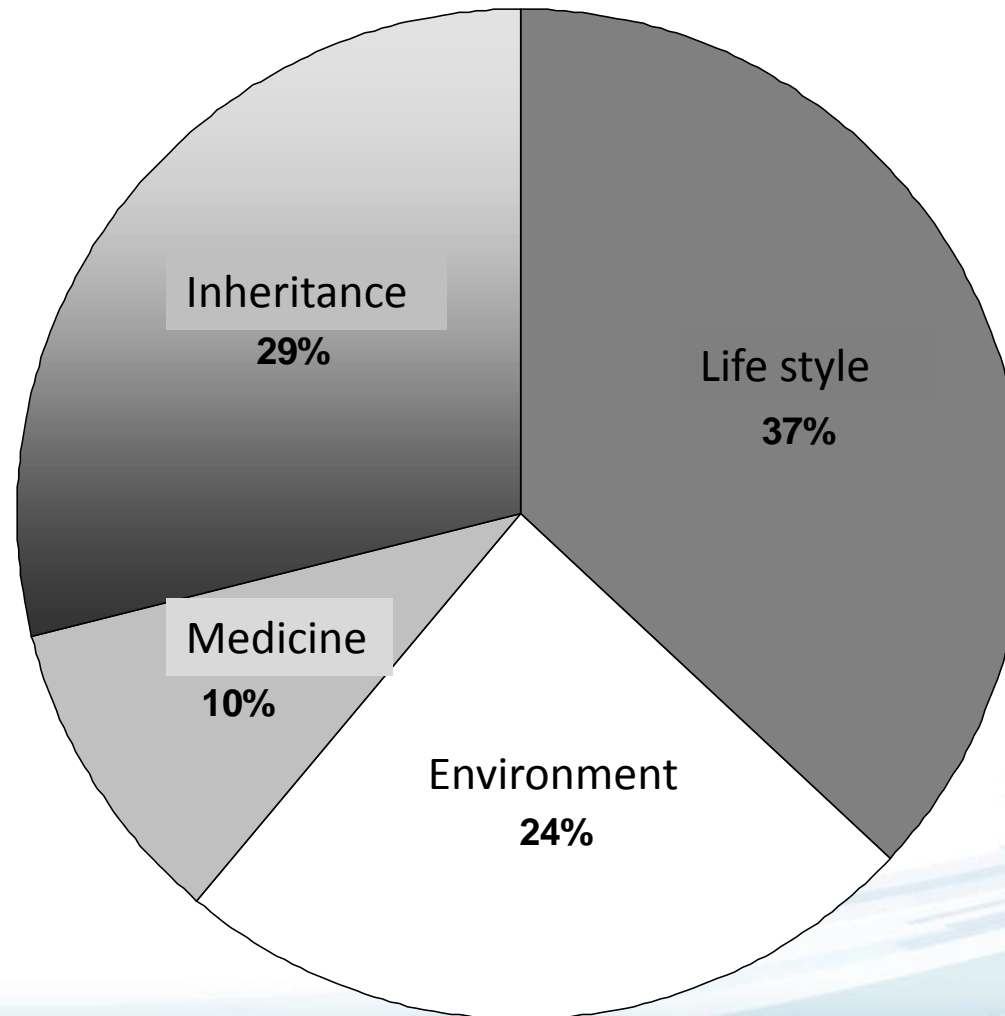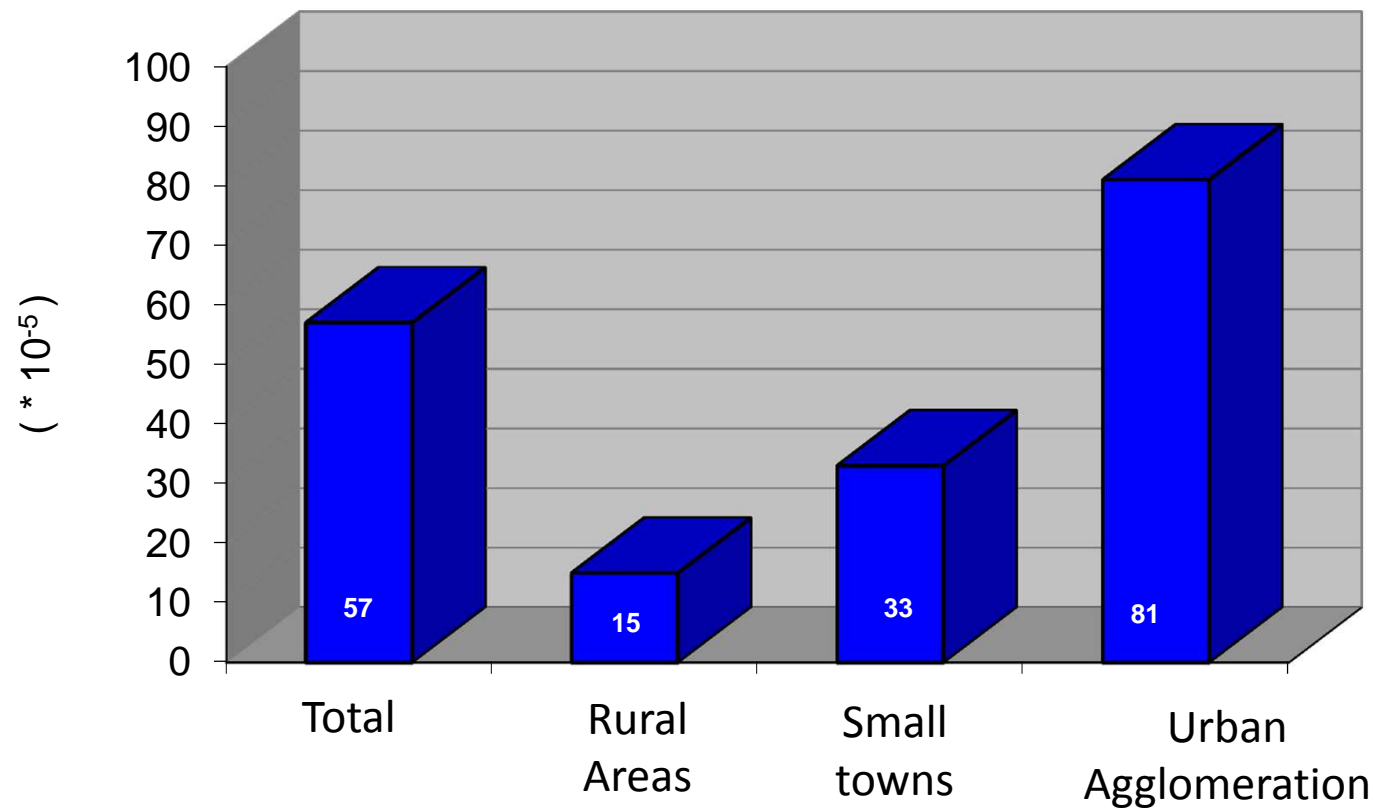
Health risk caused by environmental impacts	Lifetime risk (Mortality)
Survey Status-Quo Noise related risks of infarcts $Leq > 65 \, dB(A)$ Day $Leq > 75 \, dB(A)$ Day	20 : 1 000 70 : 1 000
Survey status quo Carcinogen exhaust gases ■ Central areas ■ Small town areas ■ Rural areas Areas near of emission sources	0,8 : 1 000 0,33 : 1 000 0,15 : 1 000 2,0 : 1 000
Regulation target Risks of cancer followed by soil pollution (hand to mouth activitiel of infants)	0,05 : 1 000
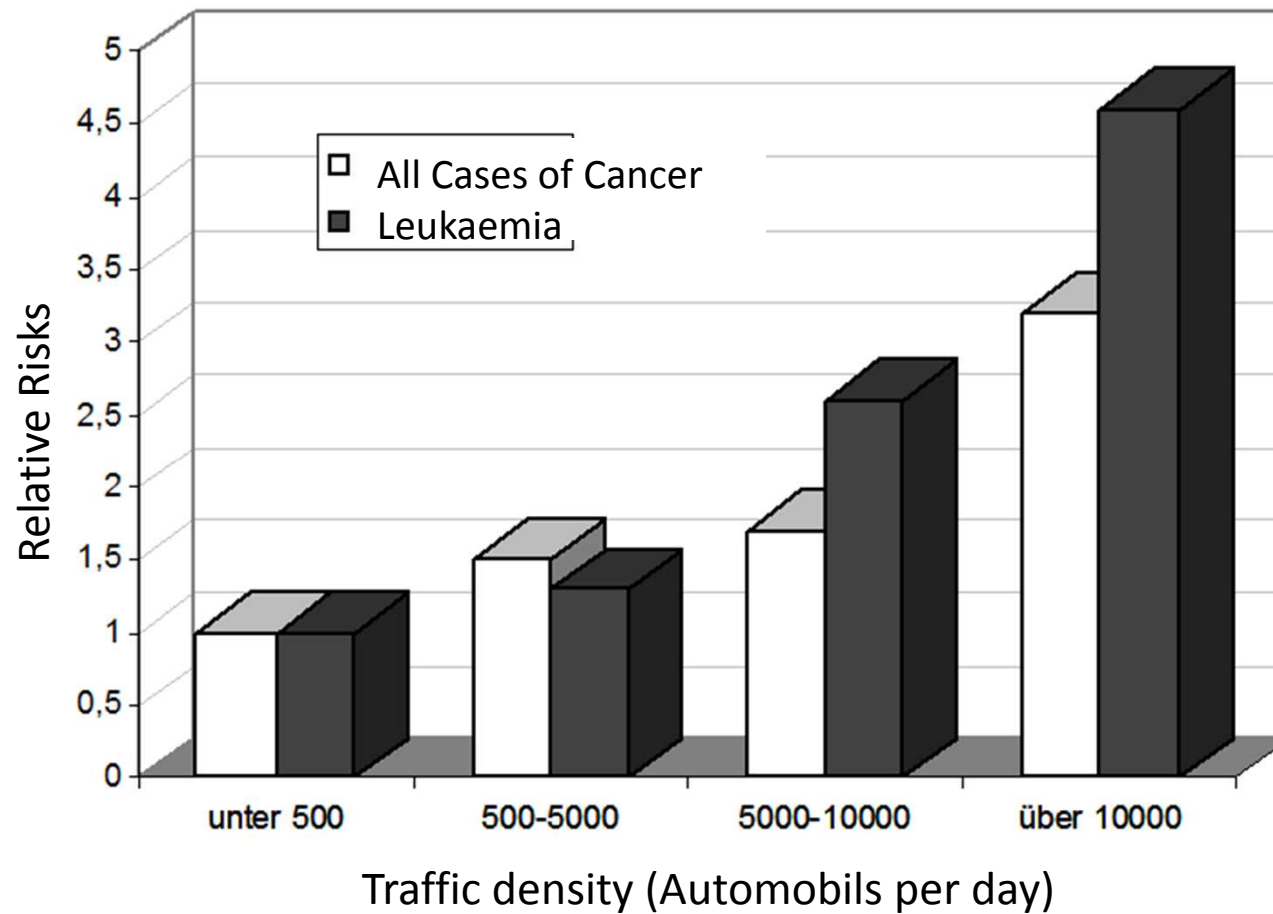
➢ Children living in areas with high concentrations of exhaust gases have more often allergies.

➢ The more particulate matters and nitrogen oxides children are exposed, the higher the risks for getting diseases like asthmatic bronchitis, hay fever, ekzema or allergic hypersensitisation

➢ In comparance with boys and girls living in more quiet residential areas those living near the stree have about 50% higher risks to get ill (allergies)

➢ Children growing up along heavily used roads have a twice as high risk to get athma.

➢ In particular affected are families with small income. They are living in urban structures along rouds with high amount of traffic.

Source: Study Helmholtz – Center, Munich, Gemany
Basis: Survey of 3000 Children in the age of 6 years

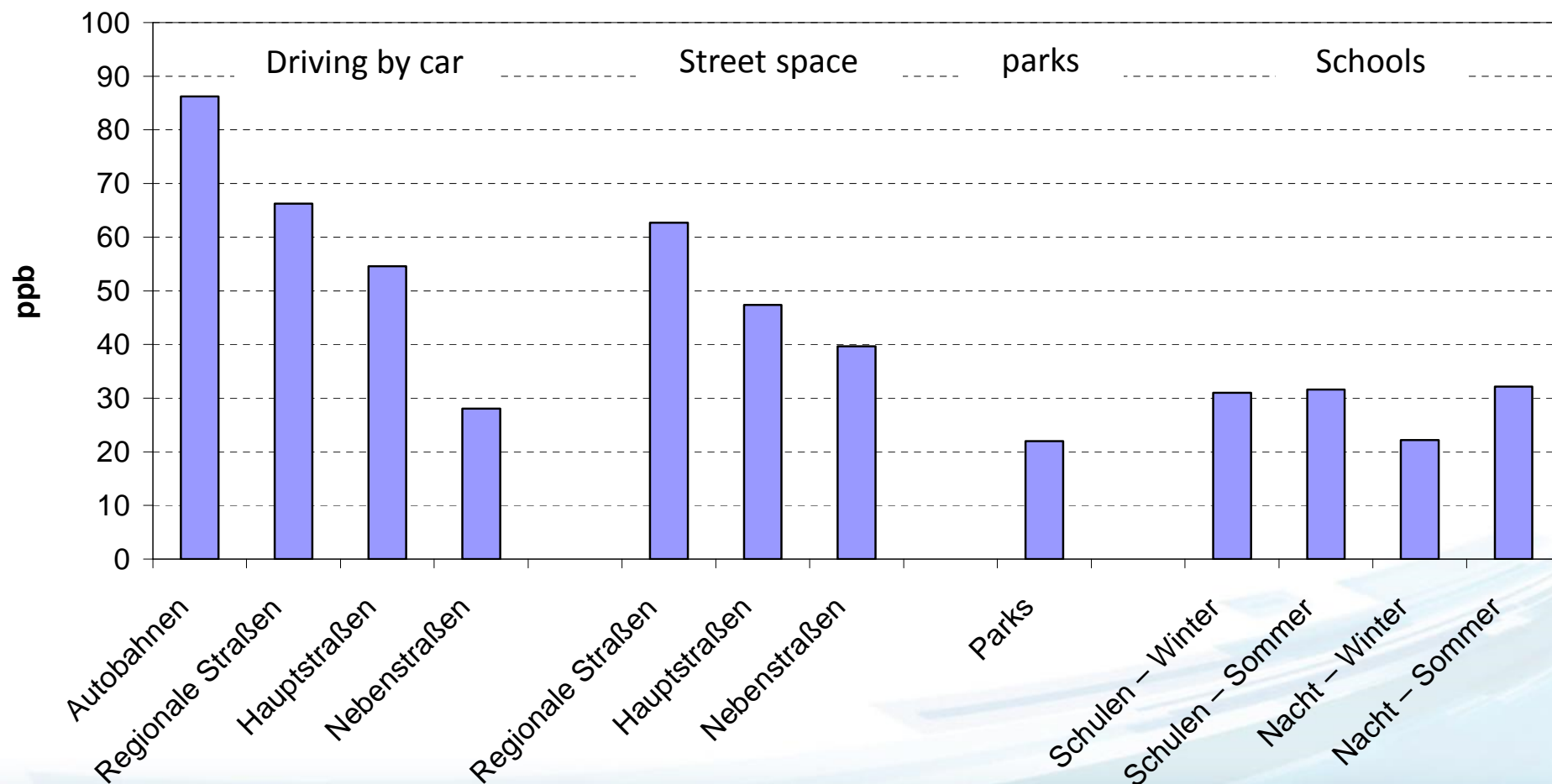# Sensitization of Children
against house dust mite, house dust or pollen
related to the duration of stay in road traffic

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ
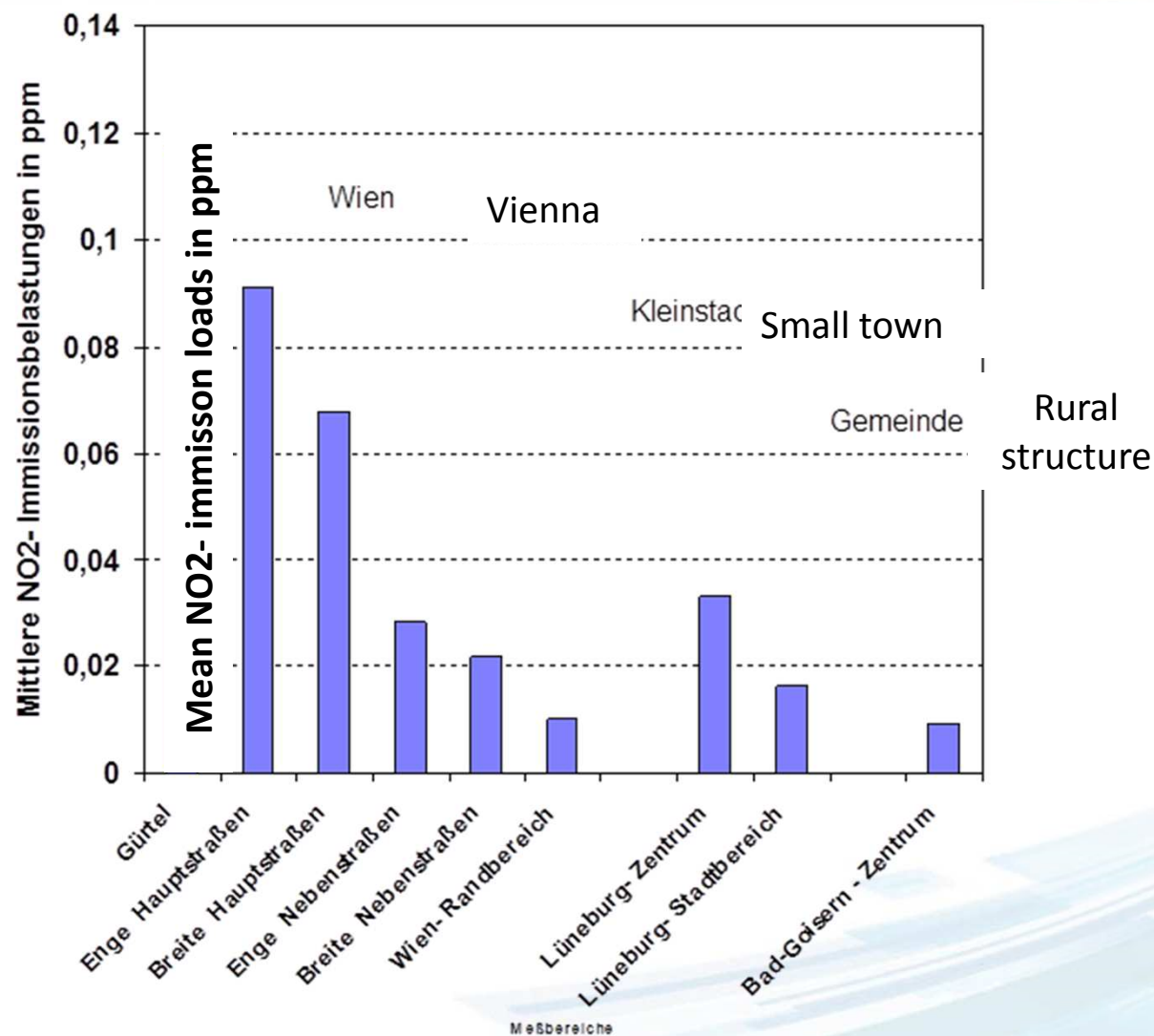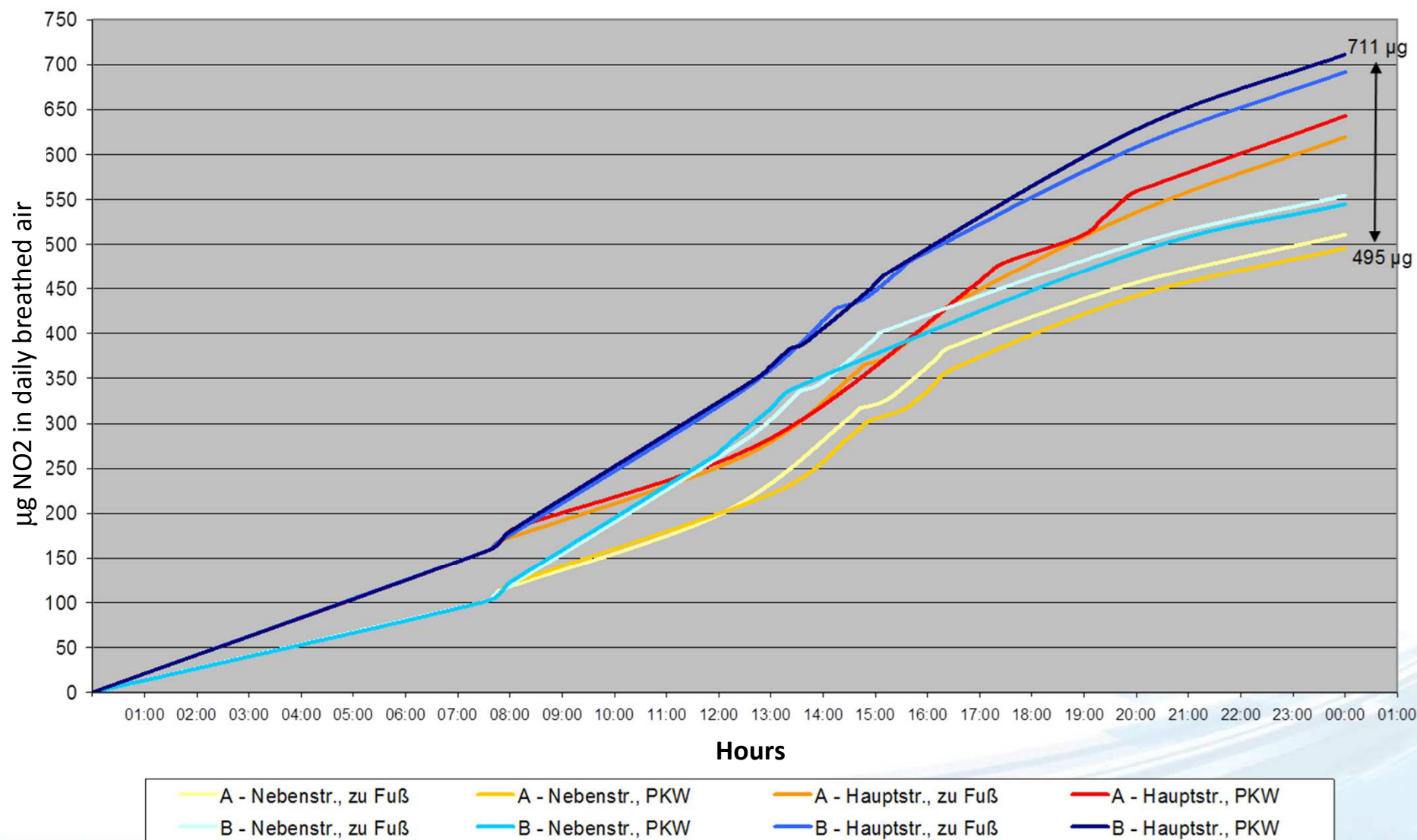
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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ
Prof. Dr. Thomas Macoun
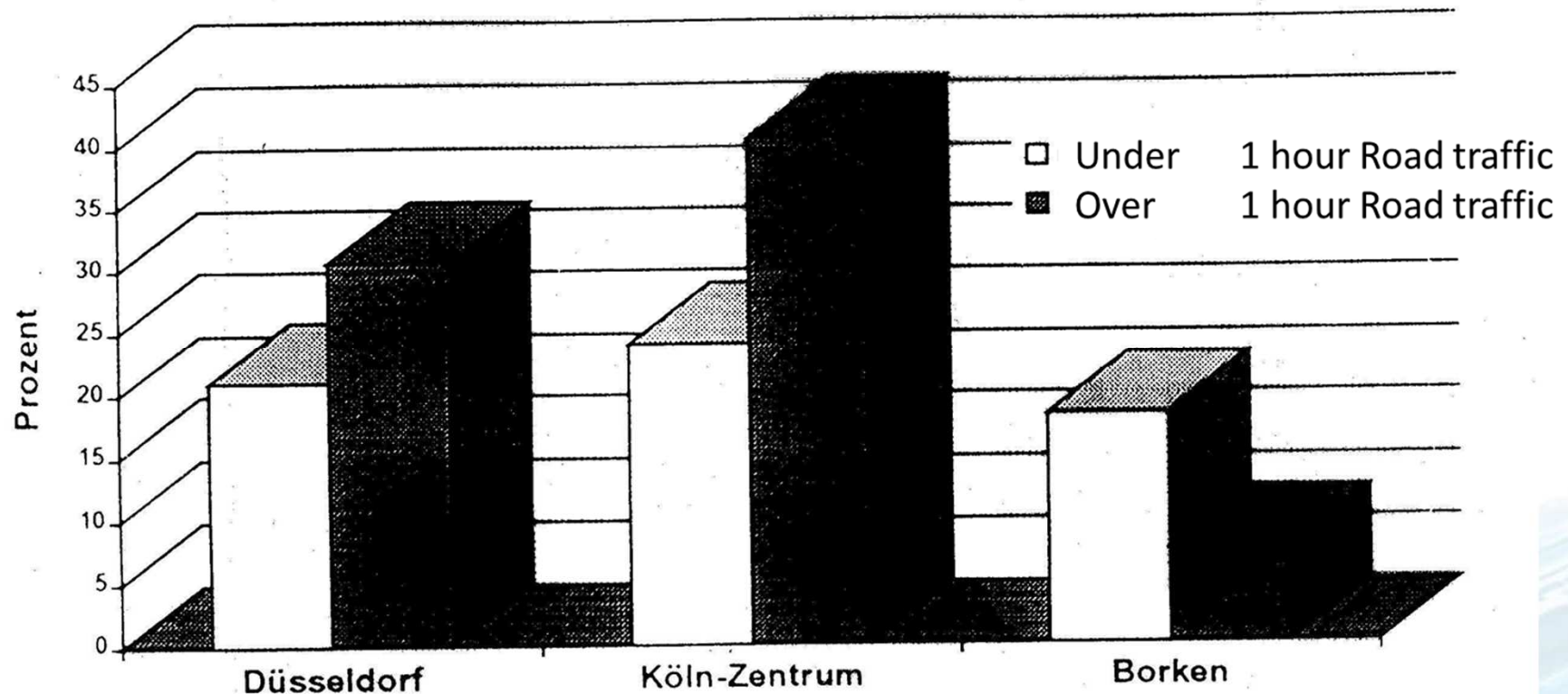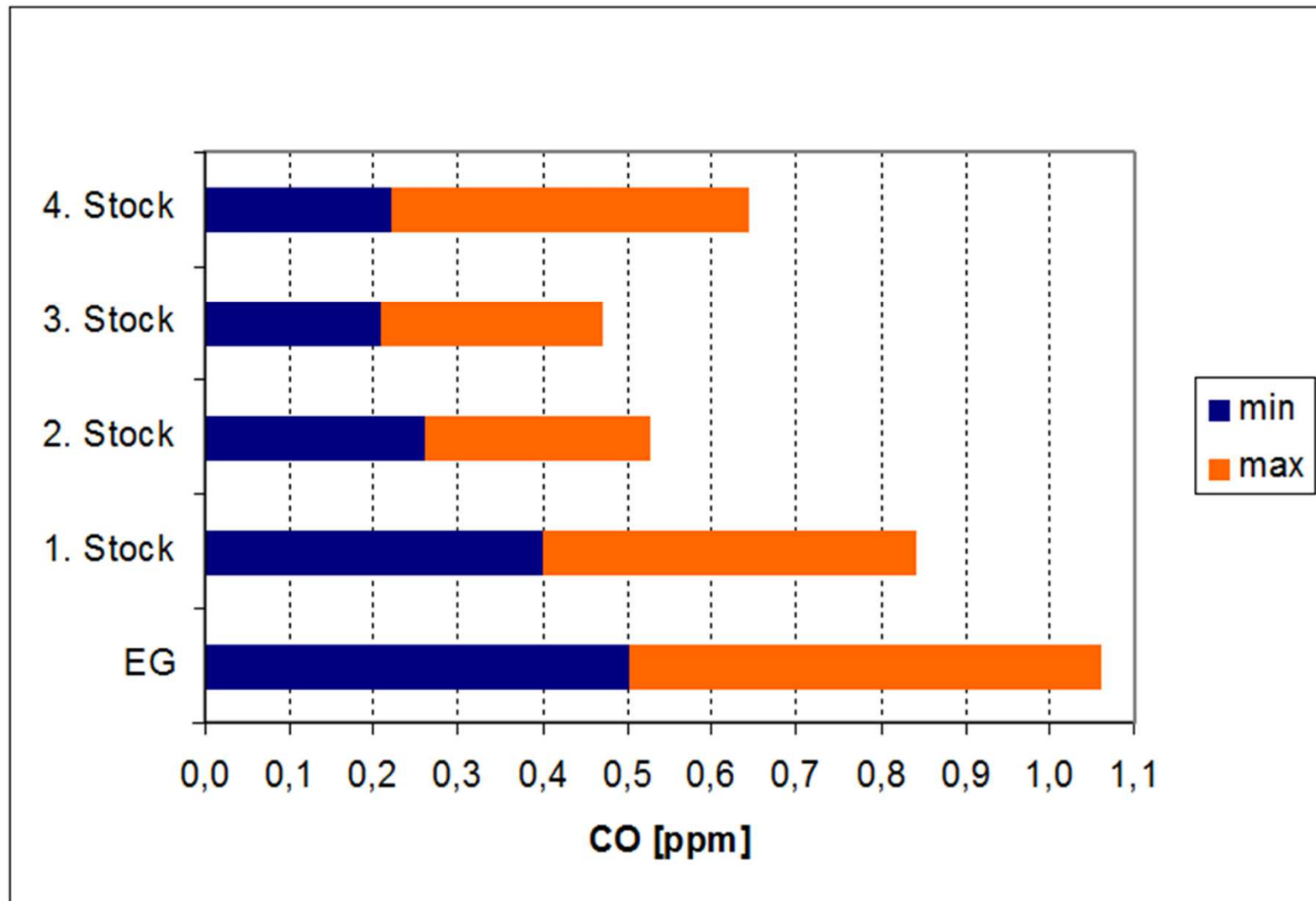
NO2

Mean values – Nitrogendioxid (NO2)

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Findings

The 312 944 cohort members contributed 4 013 131 person-years at risk.

During follow-up (mean 12·8 years), 2095 incident lung cancer cases were diagnosed.

The meta-analyses showed a statistically significant association between risk for lung cancer and PM_{10} (hazard ratio [HR] 1·22 [95% CI 1·03–1·45] per 10 µg/m^3).
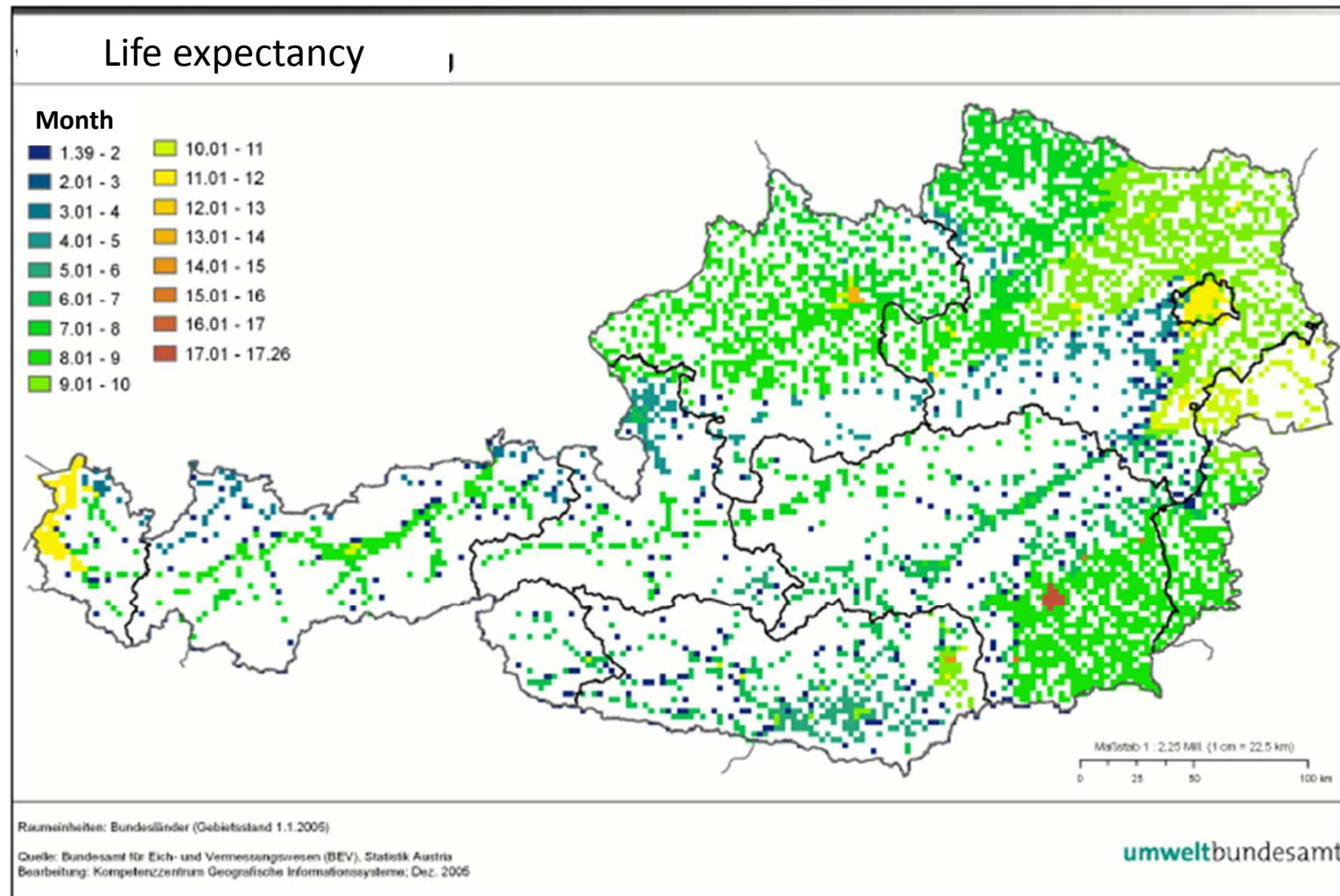
For $PM_{2.5}$ the HR was 1·18 (0·96–1·46) per 5 µg/m^3. The same increments of PM_{10} and $PM_{2.5}$ were associated with HRs for adenocarcinomas of the lung of 1·51 (1·10–2·08) and 1·55 (1·05–2·29), respectively.
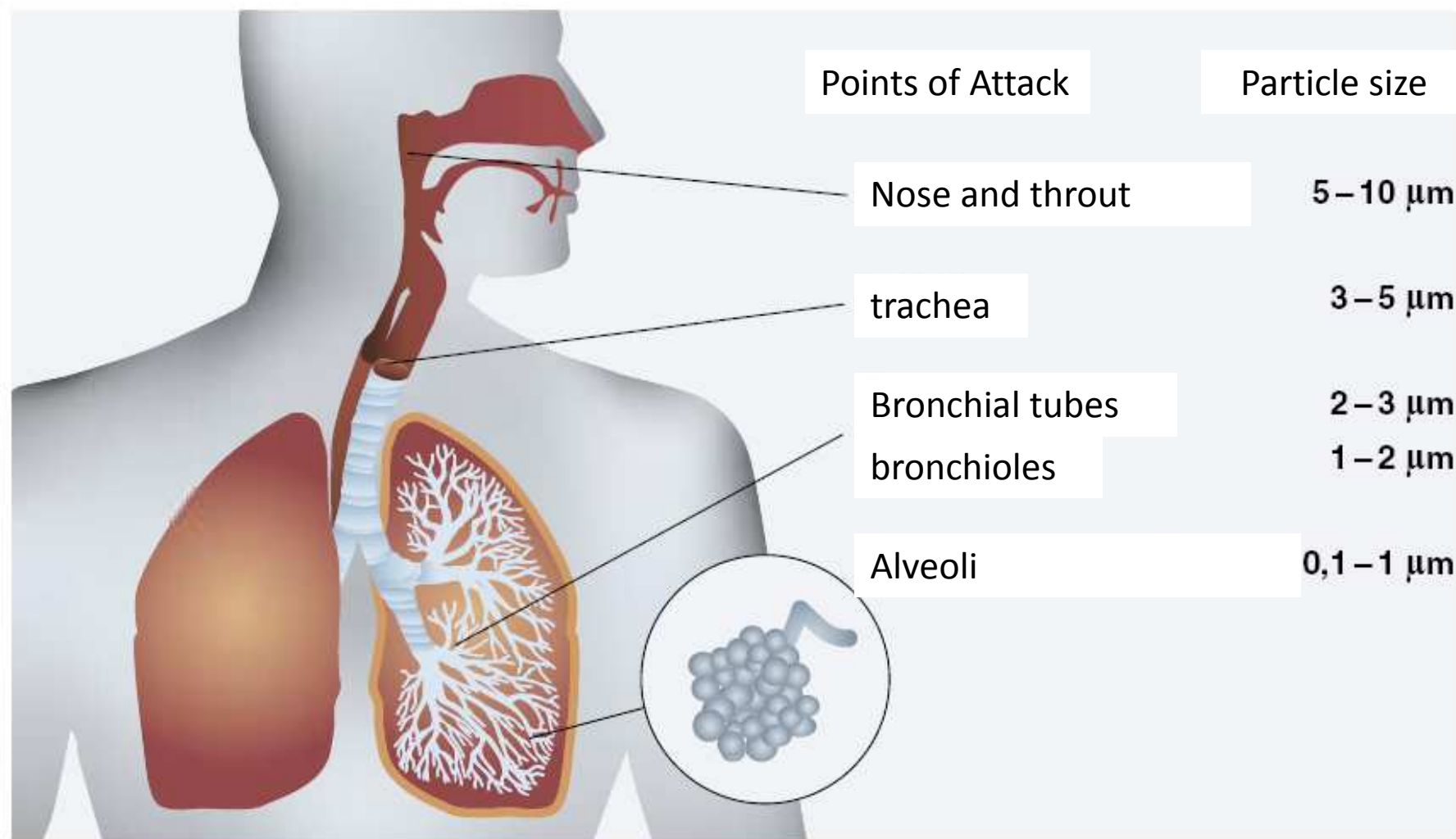
An increase in road traffic of 4000 vehicle-km per day within 100 m of the residence was associated with an HR for lung cancer of 1·09 (0·99–1·21).
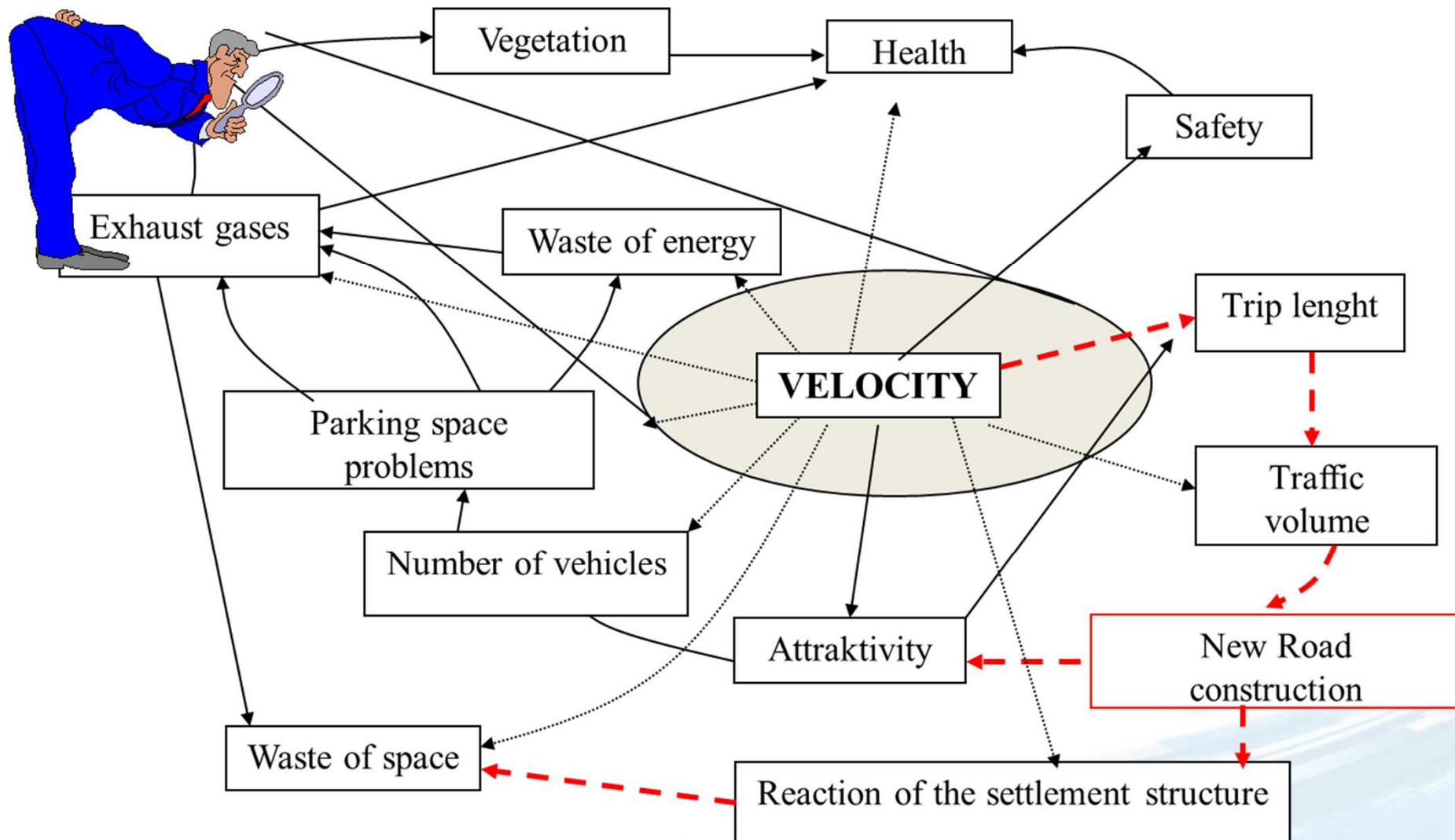
The results showed no association between lung cancer and nitrogen oxides concentration (HR 1·01 [0·95–1·07] per 20 µg/m^3) or traffic intensity on the nearest street (HR 1·00 [0·97–1·04] per 5000 vehicles per day).

(based on loads of outside air by particultate matters in Austria – in comparence with a reference value of 8 µg/m3 (PM 2,5- load as a mean of 2003 to 2004)

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Points of Attack	Particle size
Nose and throut	5 – 10 µm
trachea	3 – 5 µm
Bronchial tubes	2 – 3 µm
bronchioles	1 – 2 µm
Alveoli	0,1 – 1 µm

Environment

1.NOISE

2.CHANGE OF TRAVEL TIME

3.SAFETY

4.EXHAUST GASES

Directly effective lokal factors

getting conscious

Weighted high

Weighted poor

Sustainability

12.WASTE OF SPACE

13.FLORA AND FAUNA

14.WATER

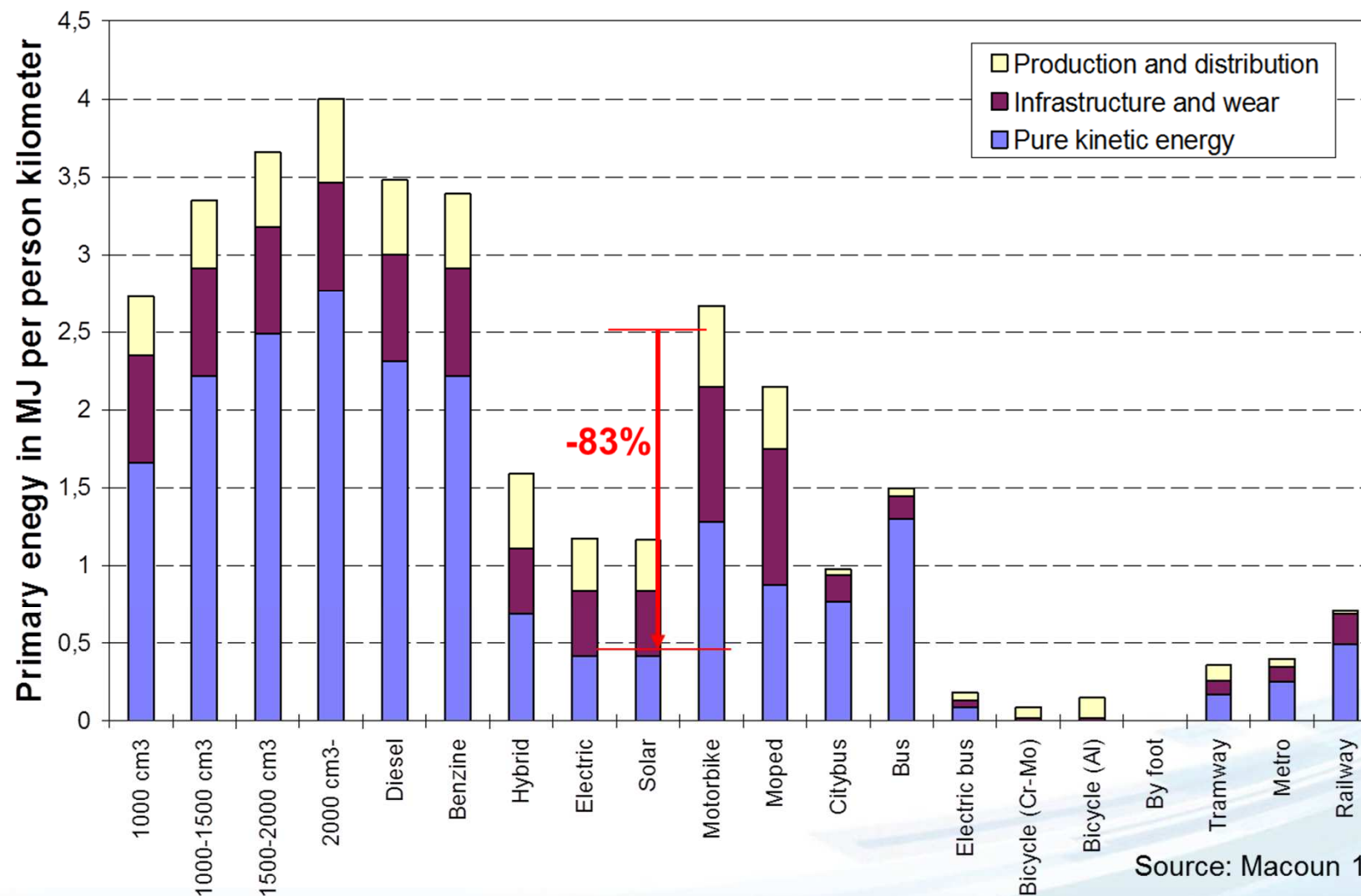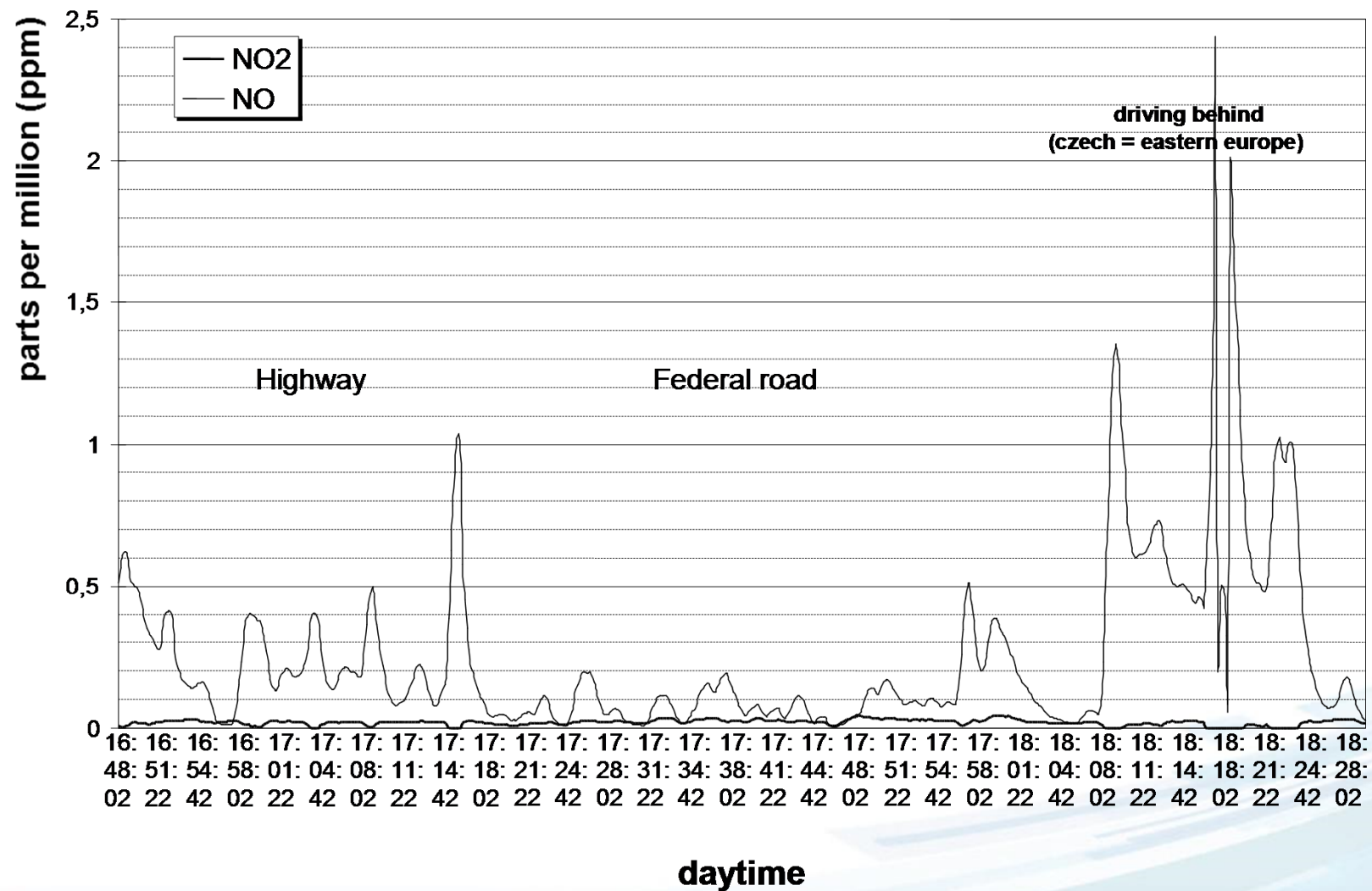15.ENERGY

Unconscious and indirect effective system factor

Car

Pedestrian

Bus

Bicycle

Tram

ultural Land
merce and craft
try
rs
nd

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Saving Energy by changing the mode of transport

Source: Macoun 1998

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Gliding half hour values

Year: 1995

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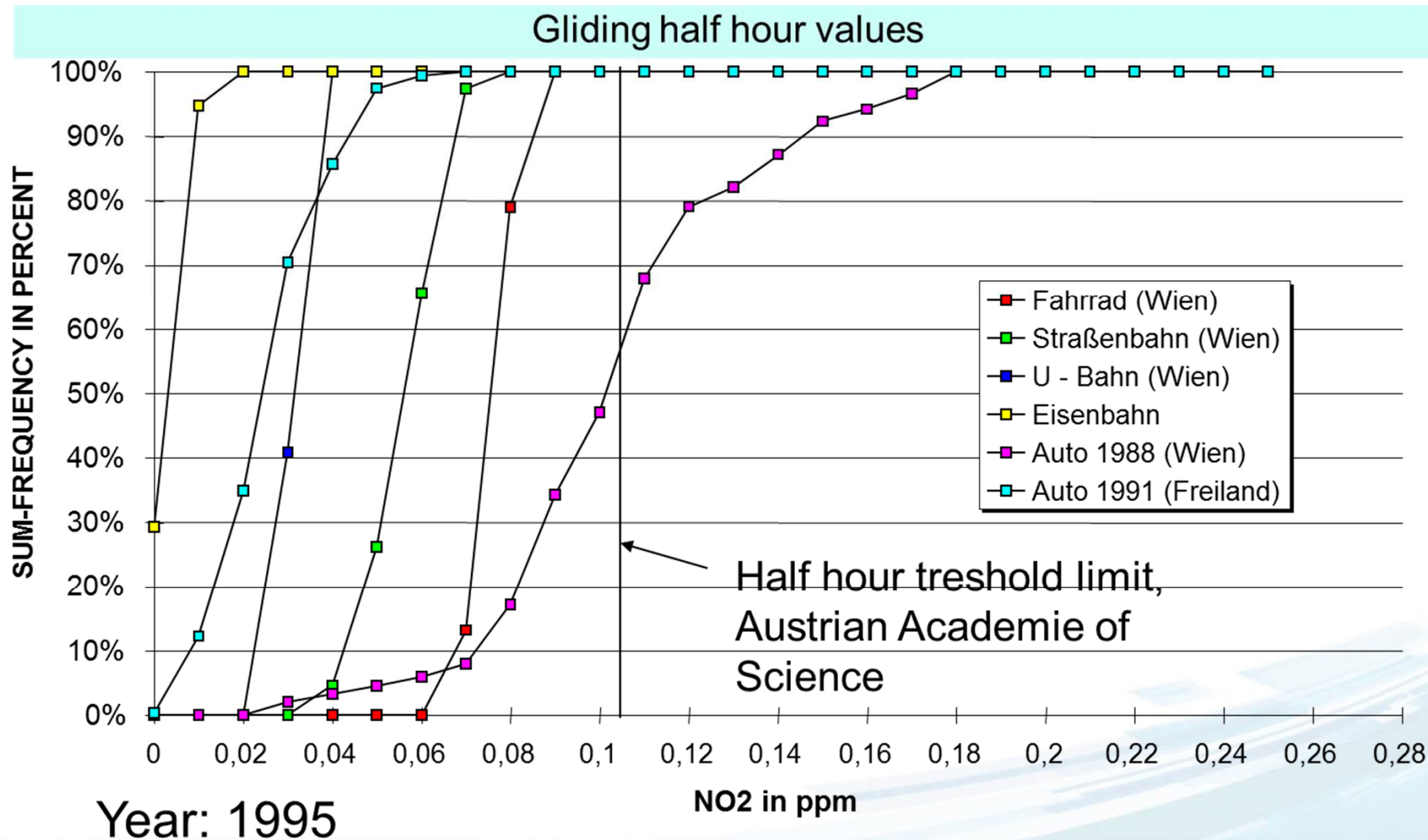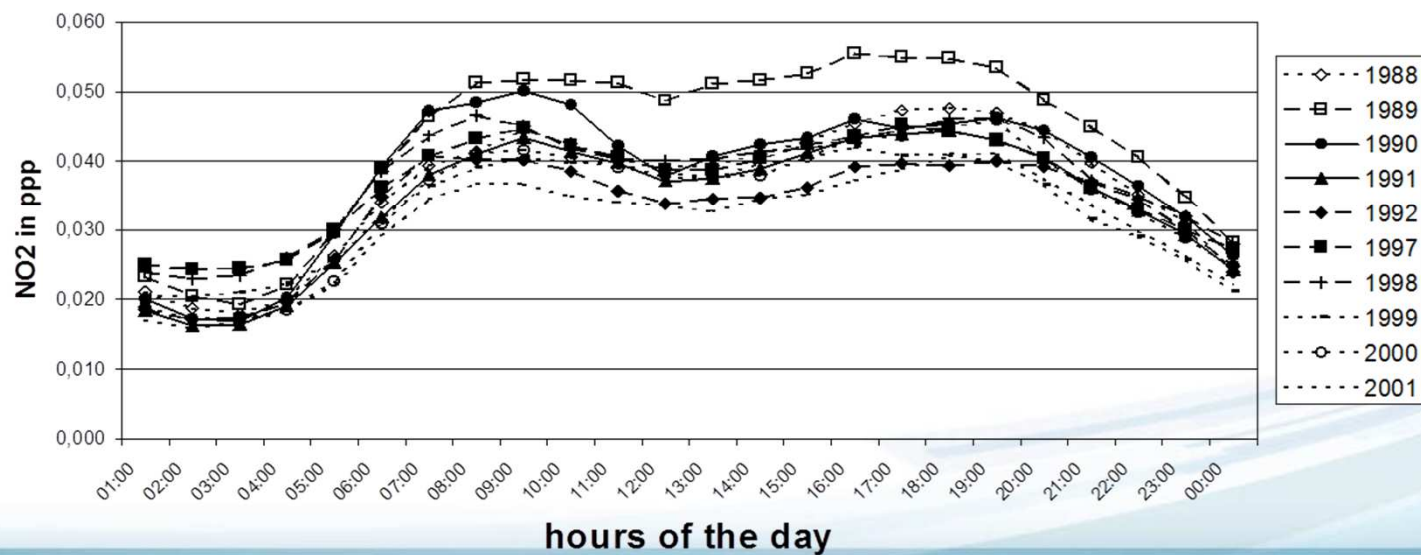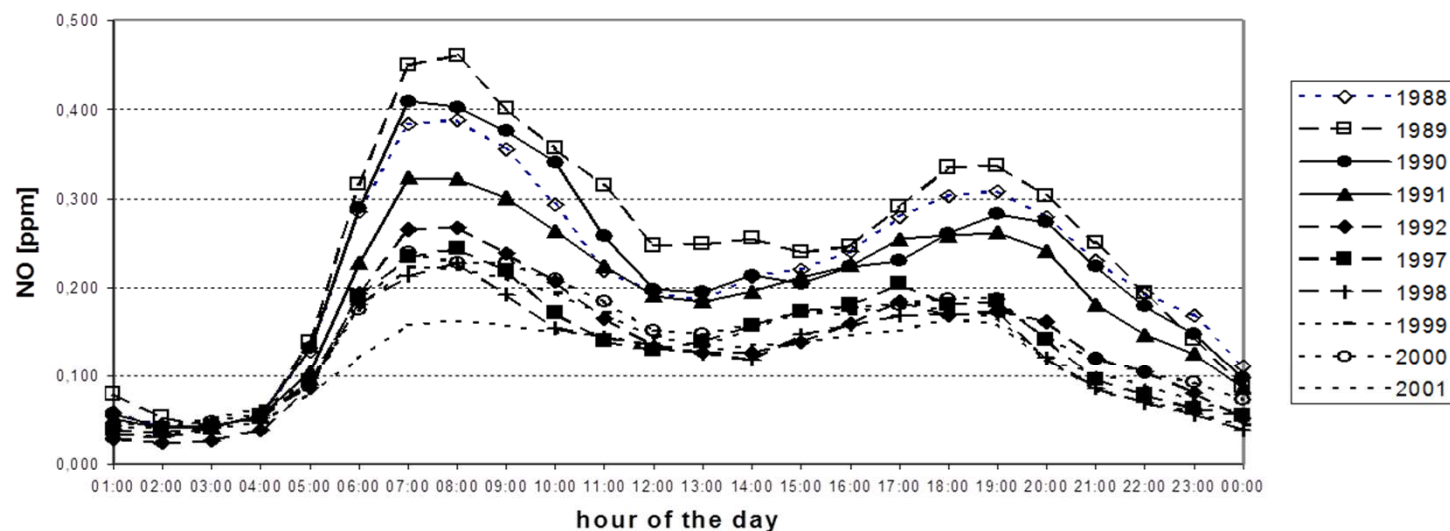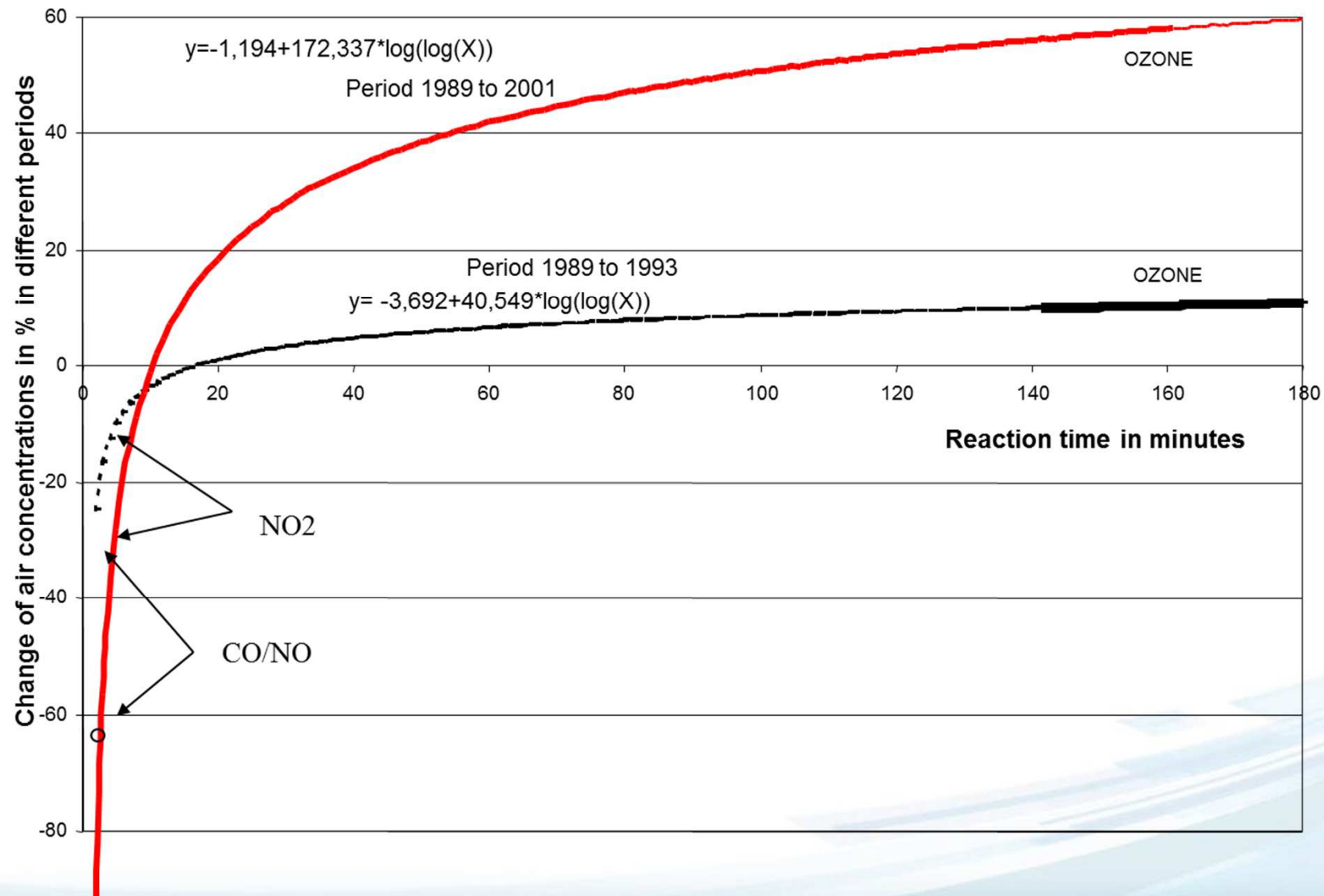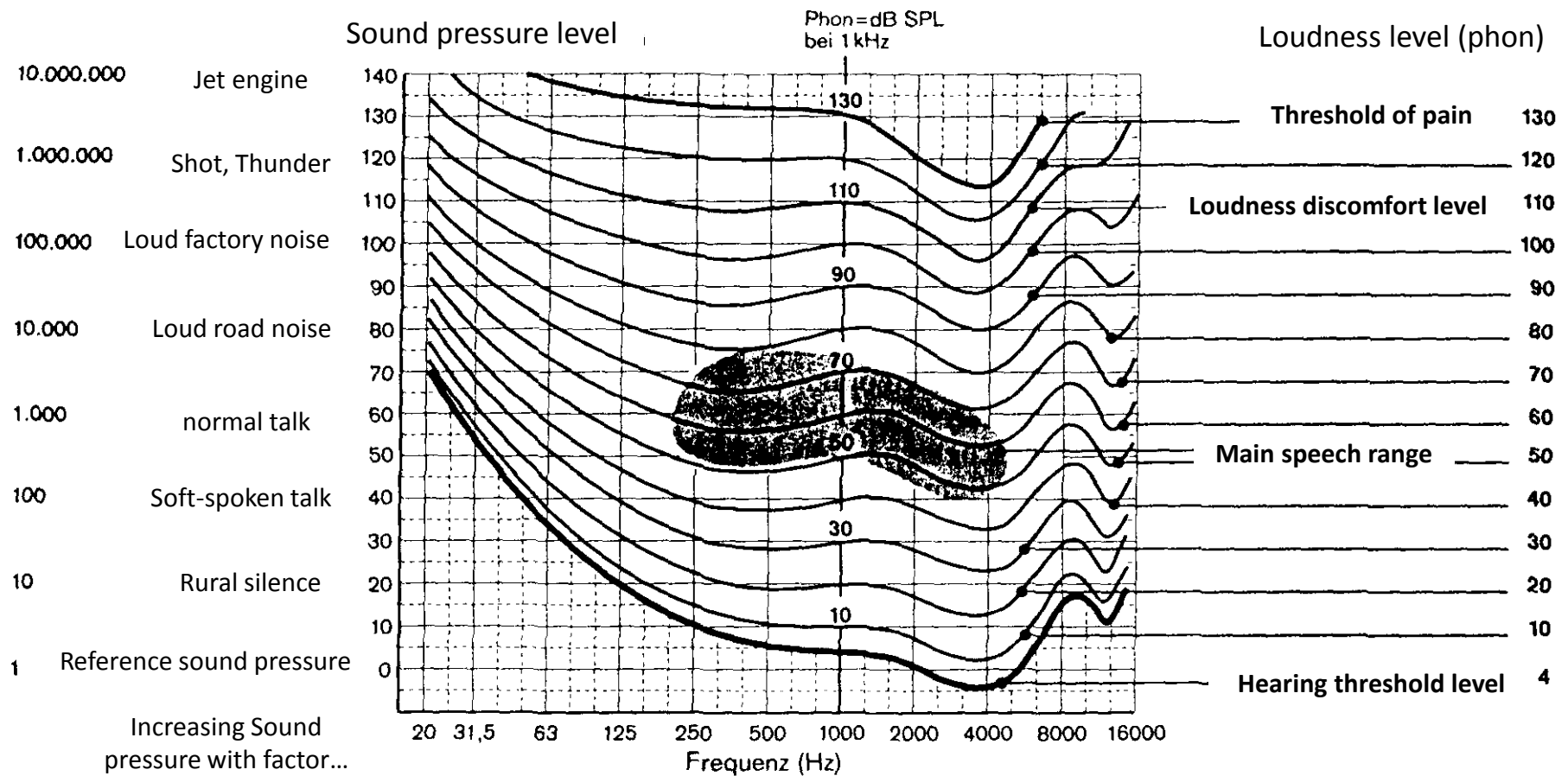
Selfdetermination

noise is often defined as disturbing - meaning unwelcome - sound.

Heteronomy

aus: Franquin, Gaston:
Gesammelte Katastrophen
Bd. 7, Carlsen Verlag,
Hamburg 1998

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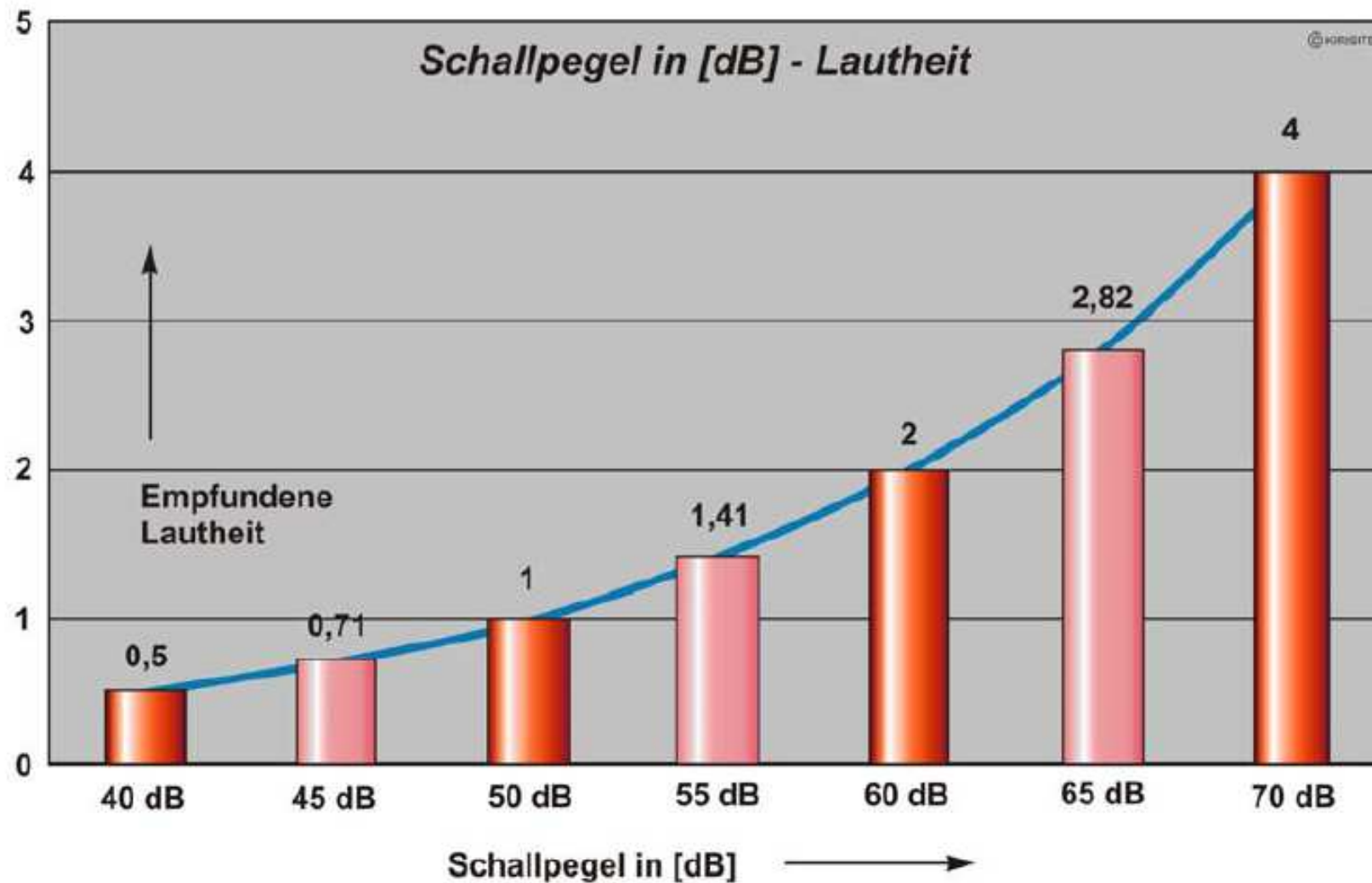
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Hearing range of humans (DIN)

Source: Klinke, Silbernagl (1996) „Lehrbuch der Physiologie
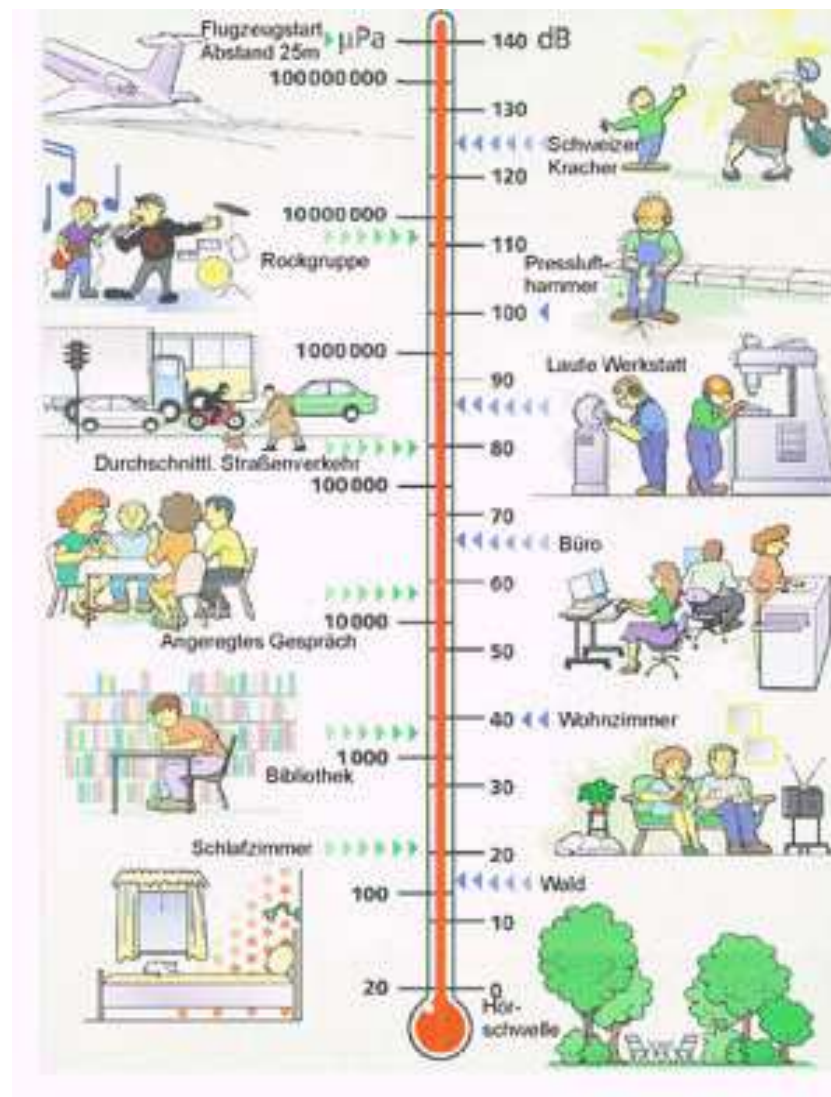
differentiation and assessment of objective and subjective graspable components of influence.

Objective Components of influence
Intensity, Duration, Frequency, Variation in time, composition of frequency, Conspicuity (abnormality), Habitualness at location, Daytime , Kind of source.

Subjective Components of influence
Health, Acitivity while accoustic influence, habituation, attitude to emitter of Noise, Emotion of Avoidablity and/or understanding of necessity of Noise.

Physical attributes of sound (e.g. Leq)

Moderator variables
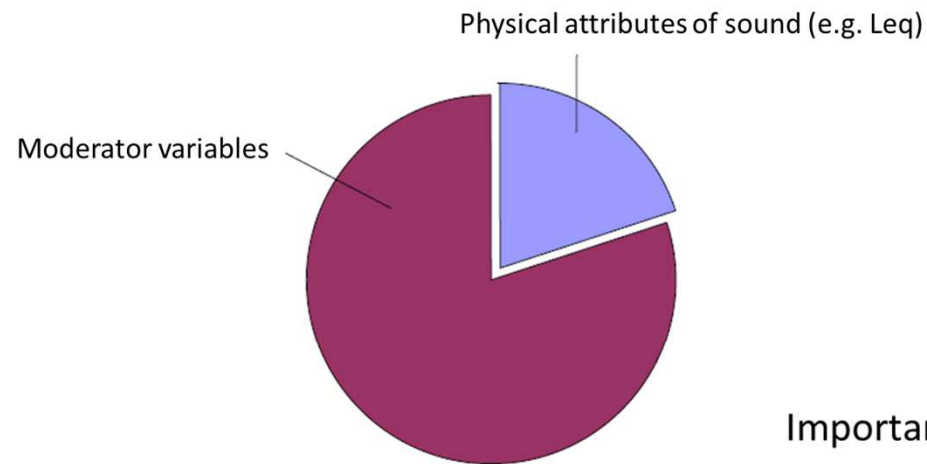
Important moderator variables
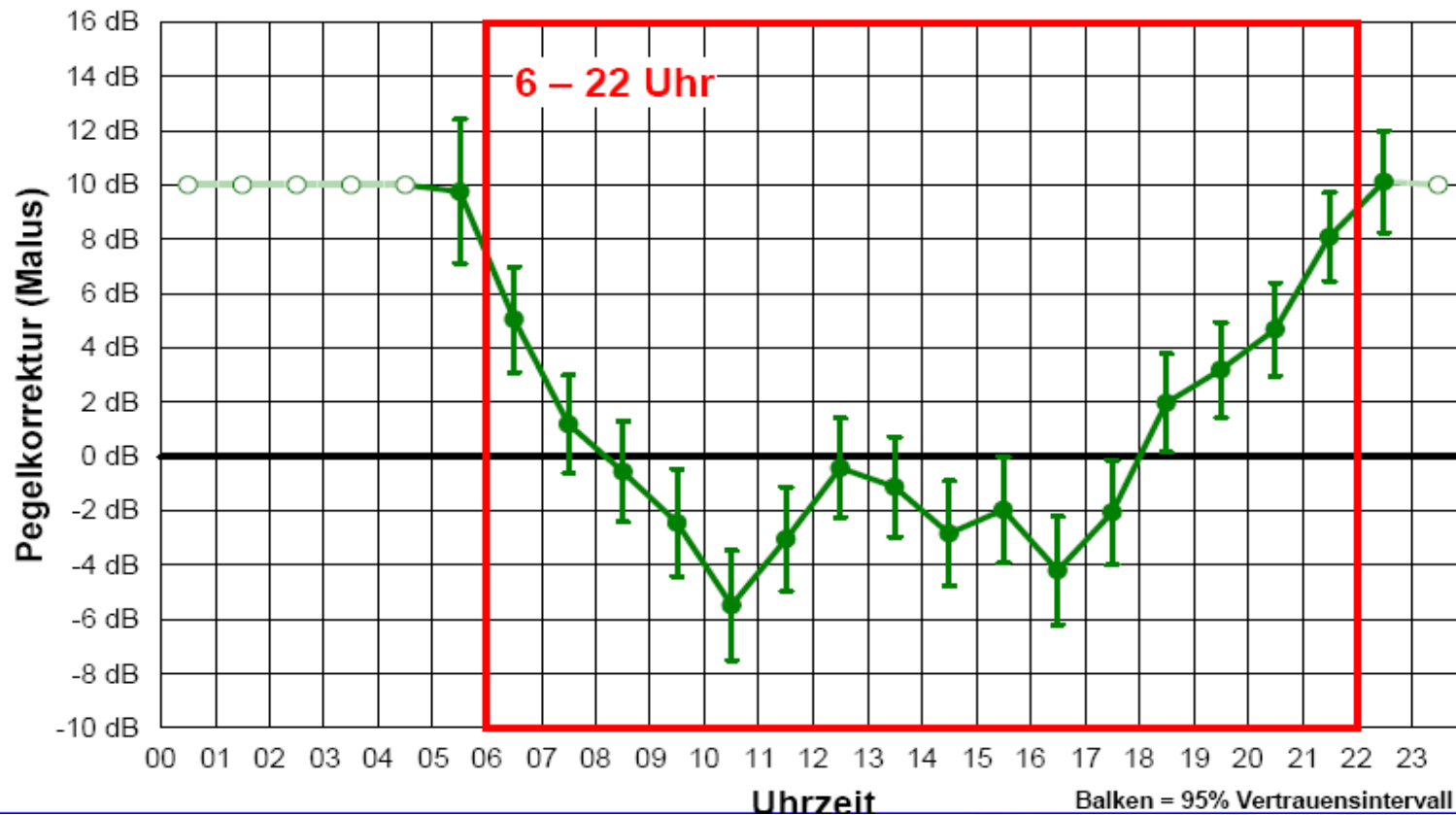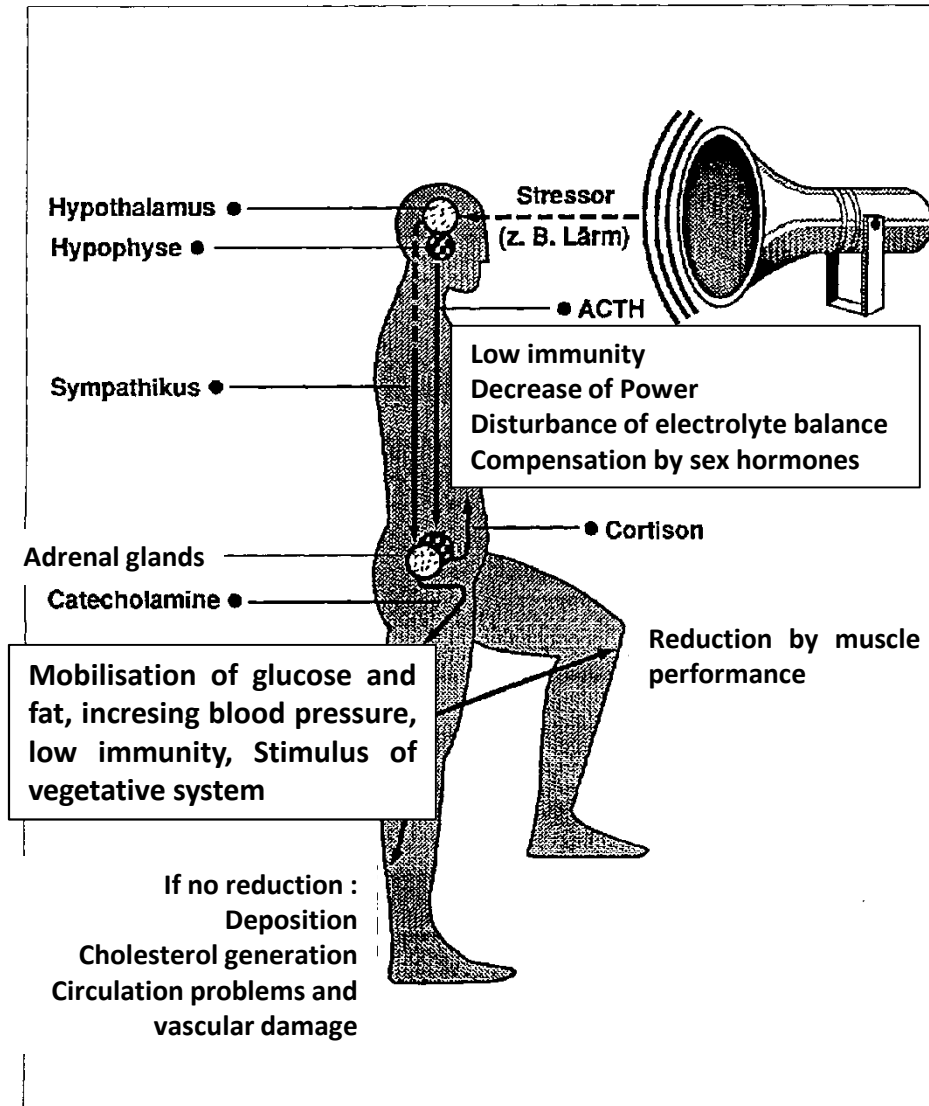
- Abilities of hearing
- Age
- Sex
- Education
- Other characteristics of personality
- Physical and psychical constitution
- Attitude against Noise emitter
- Habituation to a certain Noise source
- Time of the year
- Environmental orientation
- Sensitivity against noise

Sensitivity dependent on daytime

Hypothalamus

Hypophyse

Stressor (z. B. Lärm)

ACTH

Sympathikus

Low immunity
Decrease of Power
Disturbance of electrolyte balance
Compensation by sex hormones

Cortison

Adrenal glands

Catecholamine

Reduction by muscle performance

Mobilisation of glucose and fat, incresing blood pressure, low immunity, Stimulus of vegetative system

If no reduction :
Deposition
Cholesterol generation
Circulation problems and
vascular damage

Quelle Vesper (1973)

$L_{A,eq}$ dB outside	Target values Maximum Level dB		Effects of Noise
	inside	outside	
-	38	40	Change of sleeping quality
-	-	40	Threshold value for physiological changes (EEG at vigilambulism)
-	45	-	• Communication disturbance
45-55	-	-	• Reactions of population (0-20% Disturbed)
-	-	55	• Vegetative reactions while sleeping
-	-	55	99%-sentence understandability
-	-	60	Threshold value for awaiking
-	-	60	Primary effects (vegetativ)
65	-	-	Clear reactions of population (30-70% Disturbed, 5-15% Complaints)
-	-	75	significant vegetative Effects
80	-	-	60-90% of population strongly disturbed
-	85	-	Beginning of noise-induced hearing loss
-	-	100	Possible border of physiological balance
-	-	>130	Extraaurale Symptome with pathological significance

Pegel in dB(A)	Effects
day : 40 – 60	Restlessness, anger, Inability for mental concentration
über 60	Disturbance of Discussions, Activation of the central and vegetative nervous system, narrowings of the blood vessels, **These symptoms also appear , in case of putative habituation**
Night : über 45	Disturbance of sleep, even if there is no wake-up. The rhythm of sleep and the deep sleep phases are interrupted and disturbed

Source: Möse (1990)

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	Immission target values (in dB)			
	Day		Night	
Areas	Basic acoustic level (LG)	Equivalent continuous sound pressure level (Leq)	Basic acoustic level (LG)	Equivalent continuous sound pressure level (Leq)
Kategory A: Building areas				
Rest Areas, Spa Areas, Hospital	35	45	25	35
Residential areas in suburbs, weekend home areas, rural housing areas, schools	40	50	30	40
Municipal housing areas, Areas for agricultural and forested buildings, business areas with homes	45	55	35	45
Business zones (bureaus,, shops, markets, administration without Noise emissions, Housings), Areas for firms without noise emission	50	60	40	50

Austrian ÖNORM S 5021

Planungsrichtwerte für zulässige Immissionen (Immissionsgrenzwerte) nach ÖNORM S5012

Road noise is measured by a mean value LA,eq
(LA,eq = Equivalent continuous sound pressure level)

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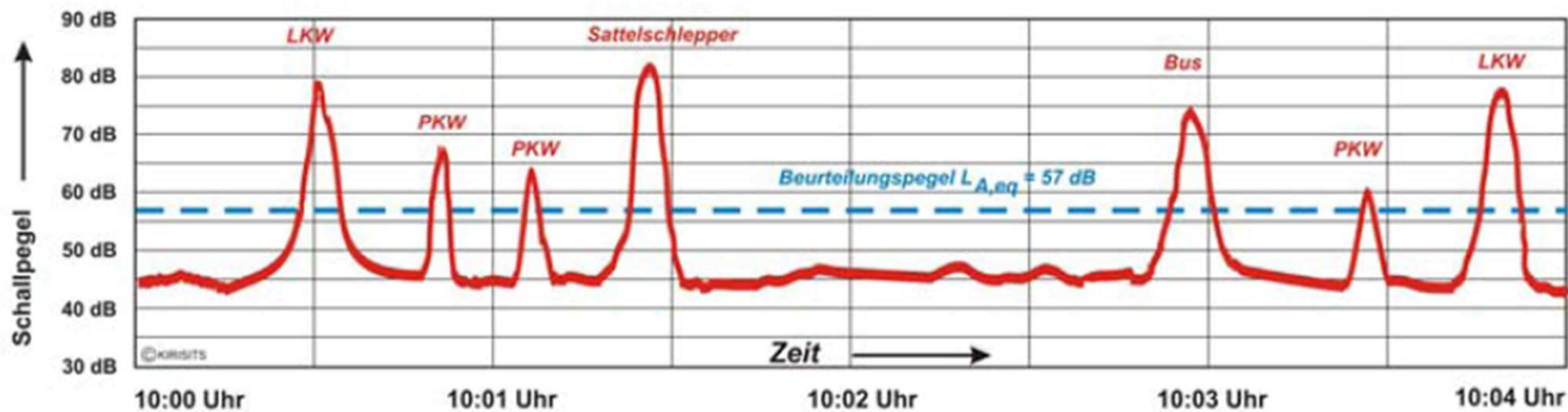
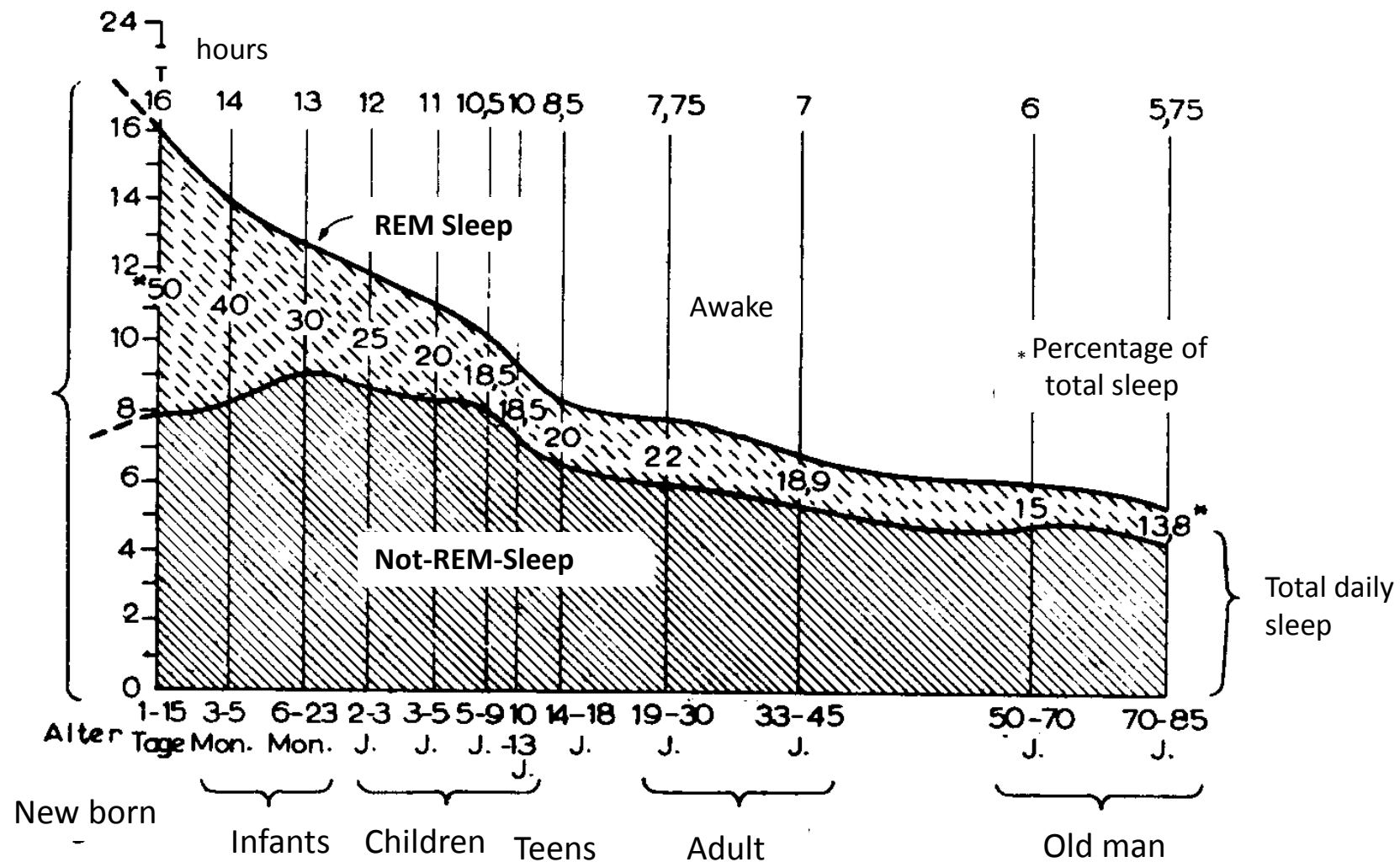|	
Change of Sleep	Prolonged Time to fall asleep
	Shortened duration of sleeping time
	Reduction of slow-wave sleep phase
	Reduction of dream sleeping phase
	More frequent awaking
	Subjective: reduced quality of sleep
Psychological changes	Increasing heart rate/ frequency
	Increase body movement while sleeping
Psychic/physic consequences	Tiredness; feeling to be not well-rested
	Change of moods
	Reduction of Performance
	Enhanced accident risks
	Enhanced consumption of sleeping pills (risk of addiction)
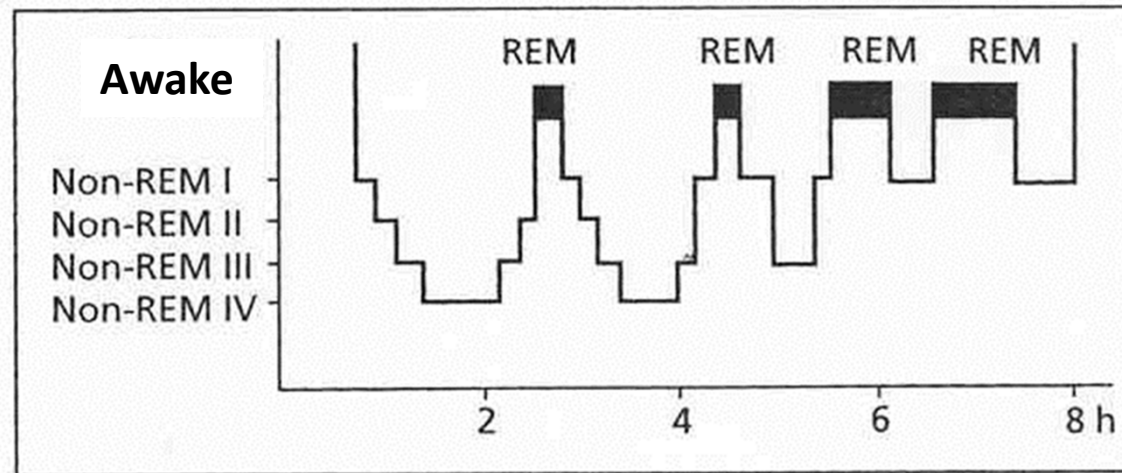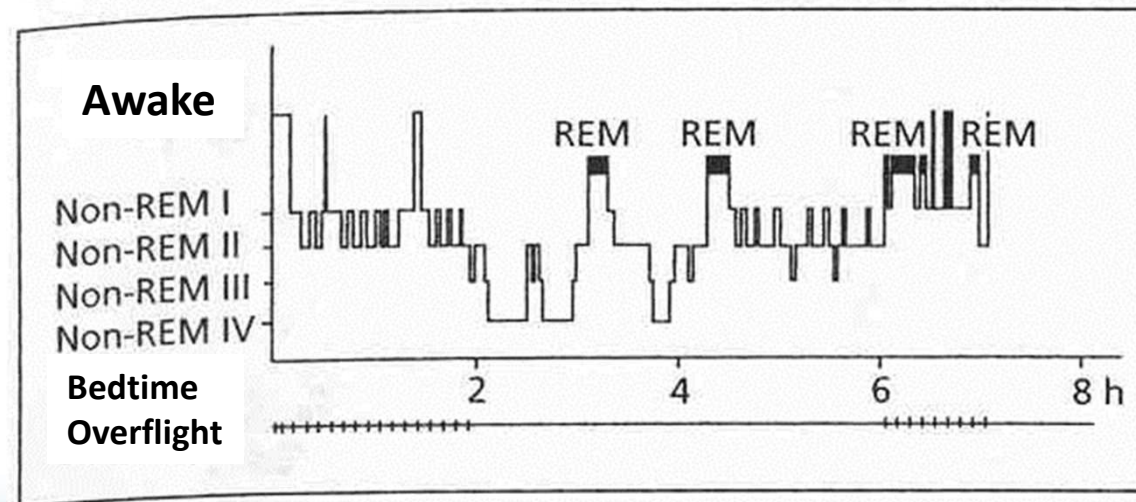
REM = Rapid Eye Movement

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Quelle: Ising 1978

$$L(v) = L(70 \text{ km/h}) + B \cdot \log(v/70 \text{ km/h})$$

- 6 dB
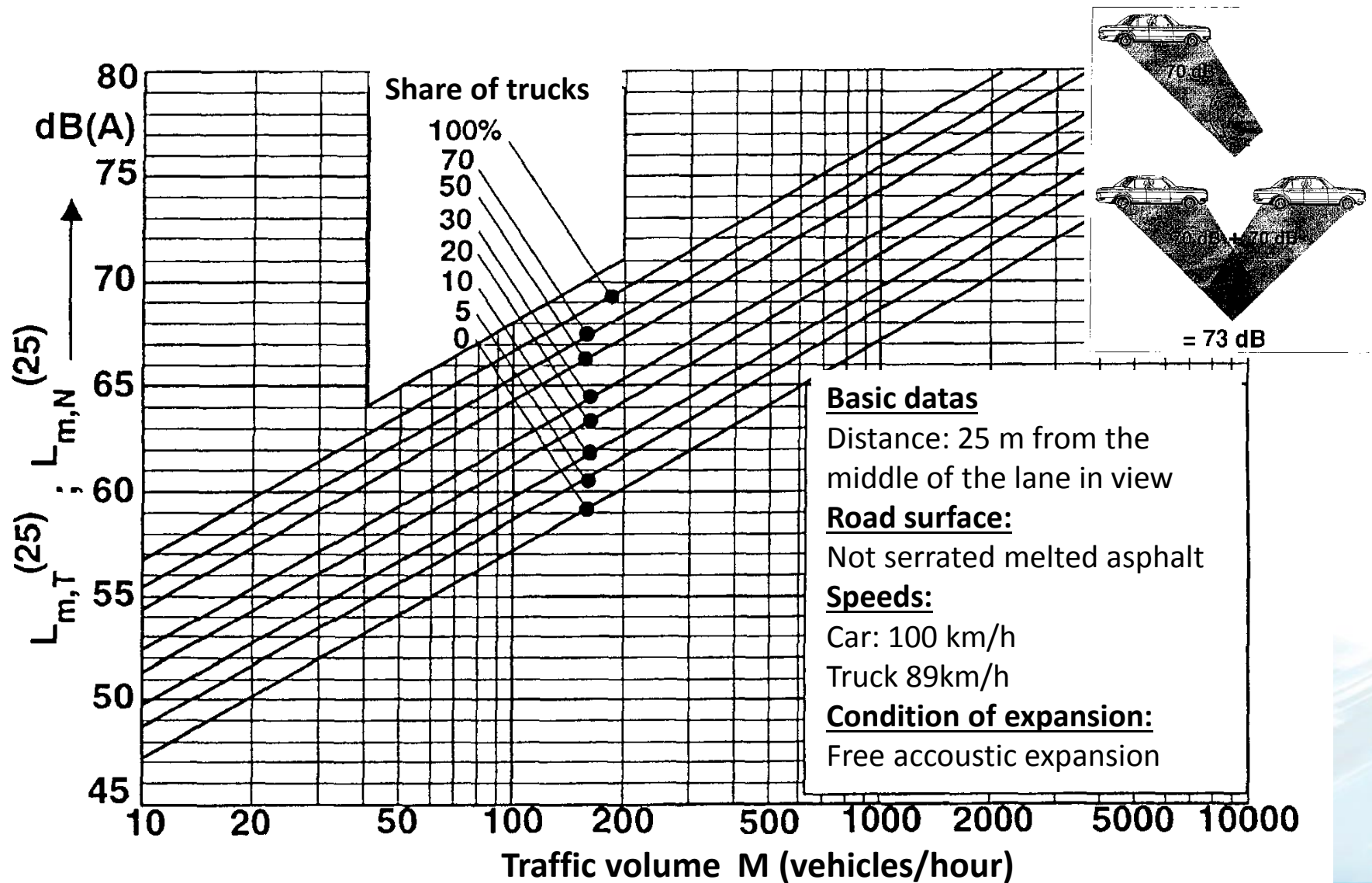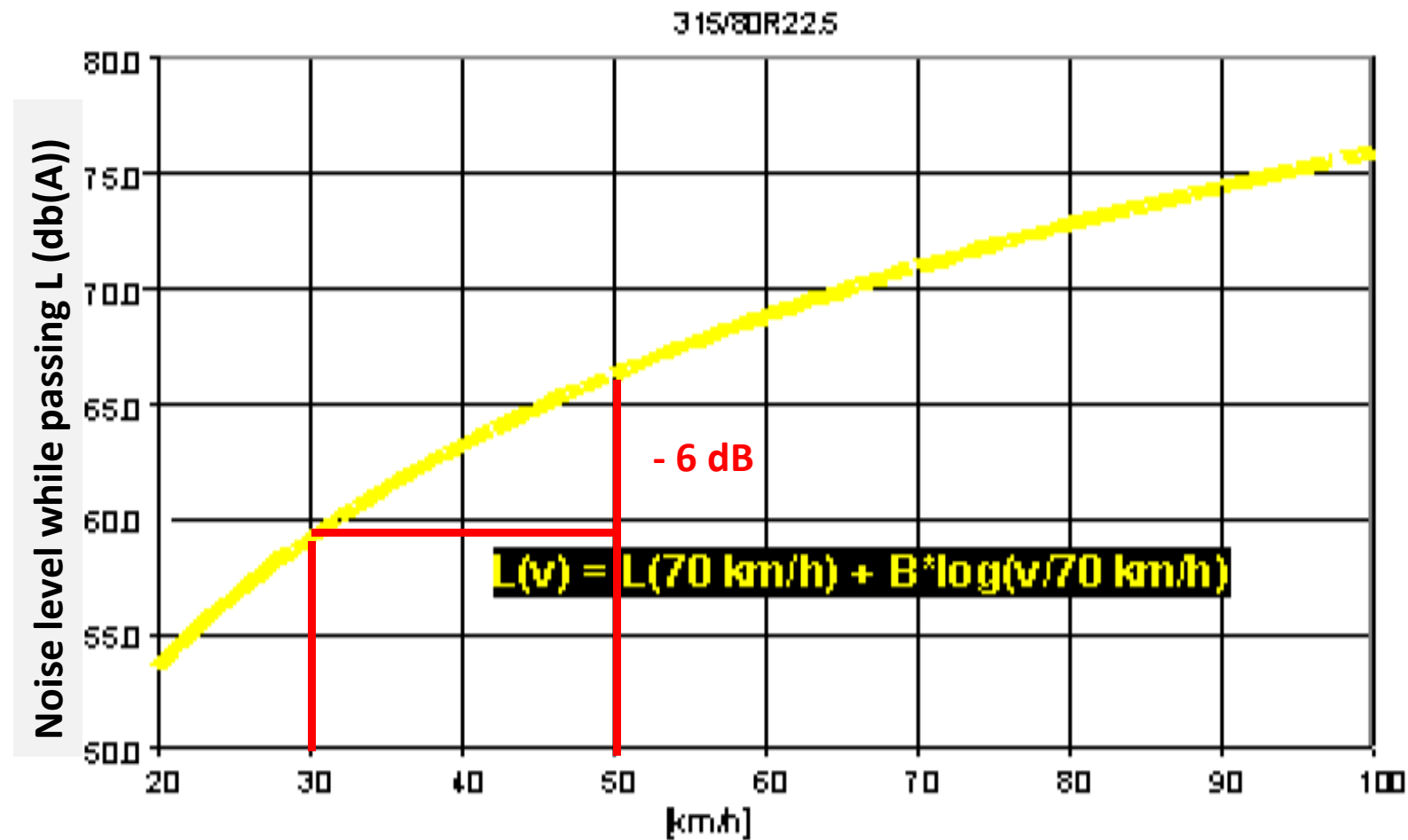
Thank you for attention

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Assessment problems of noise

ASSESSMENT OF NOISE
Tape recording „weaving machine" 70dB
Different declarations
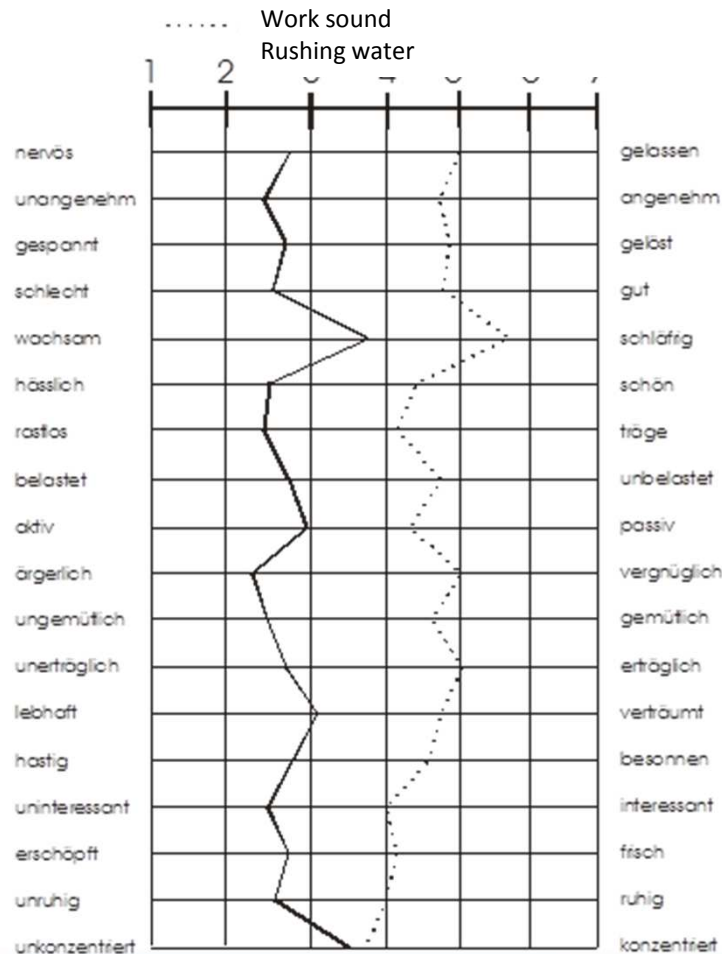
Assessment at 70 and 90 dB
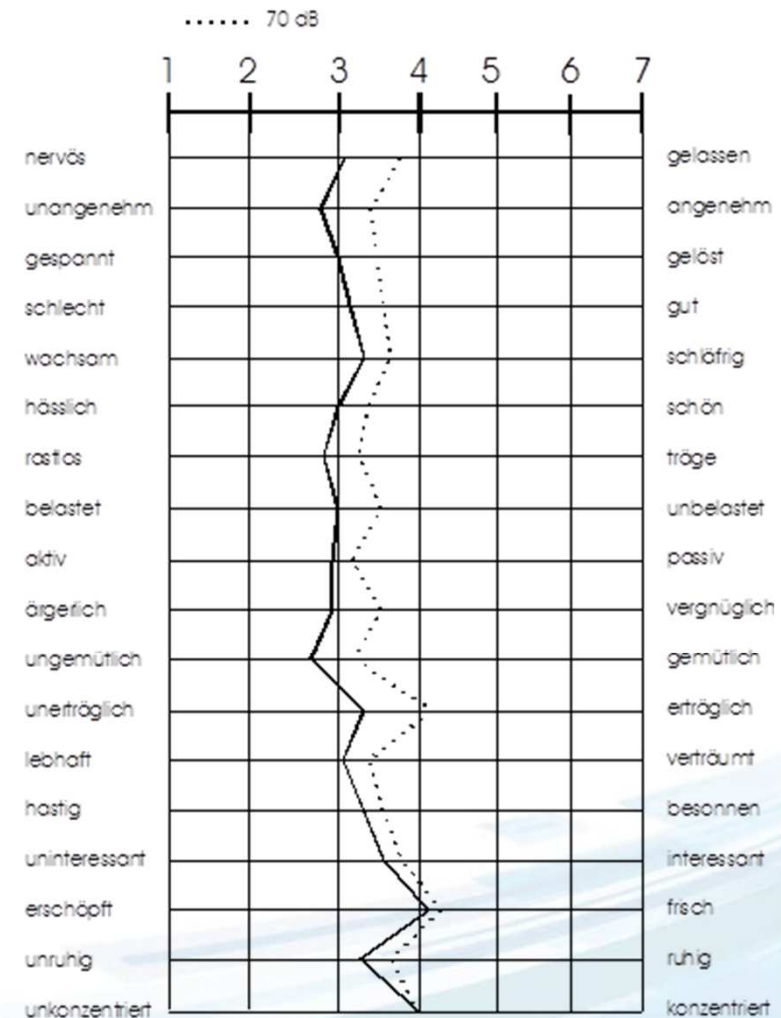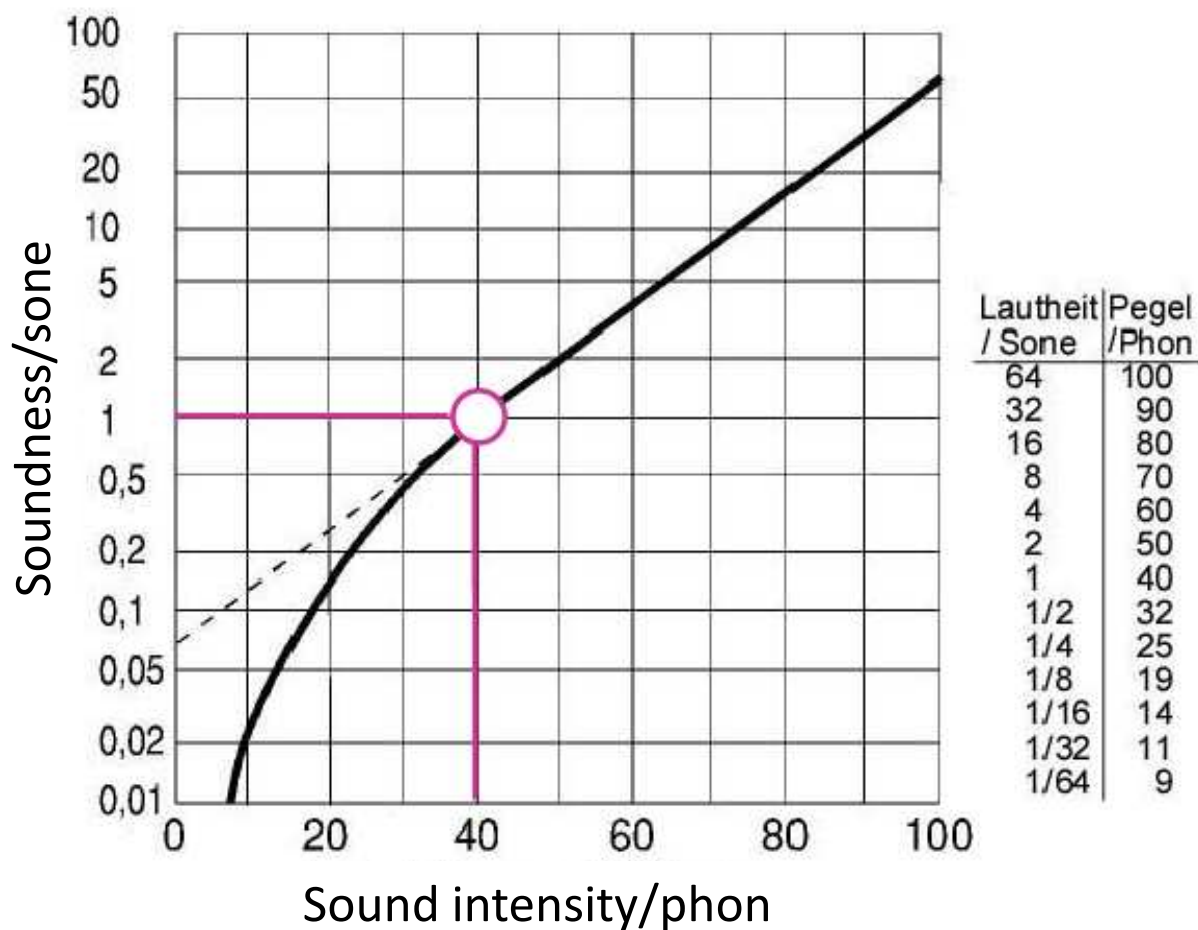
Genormte Messverfahren für die Einheit sone: DIN 45631 und ISO 532 B

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Signal transfomation in the ear

Drumhead	→	Basilar membrane	→	Hair Cell	→	Accoustic nerve

Mechanic transformation

Mechanic-electric transformation

Electric-Electric transformation

Impulse energy

Receptor potential

Action potential

Mechanic energy

Electric energy
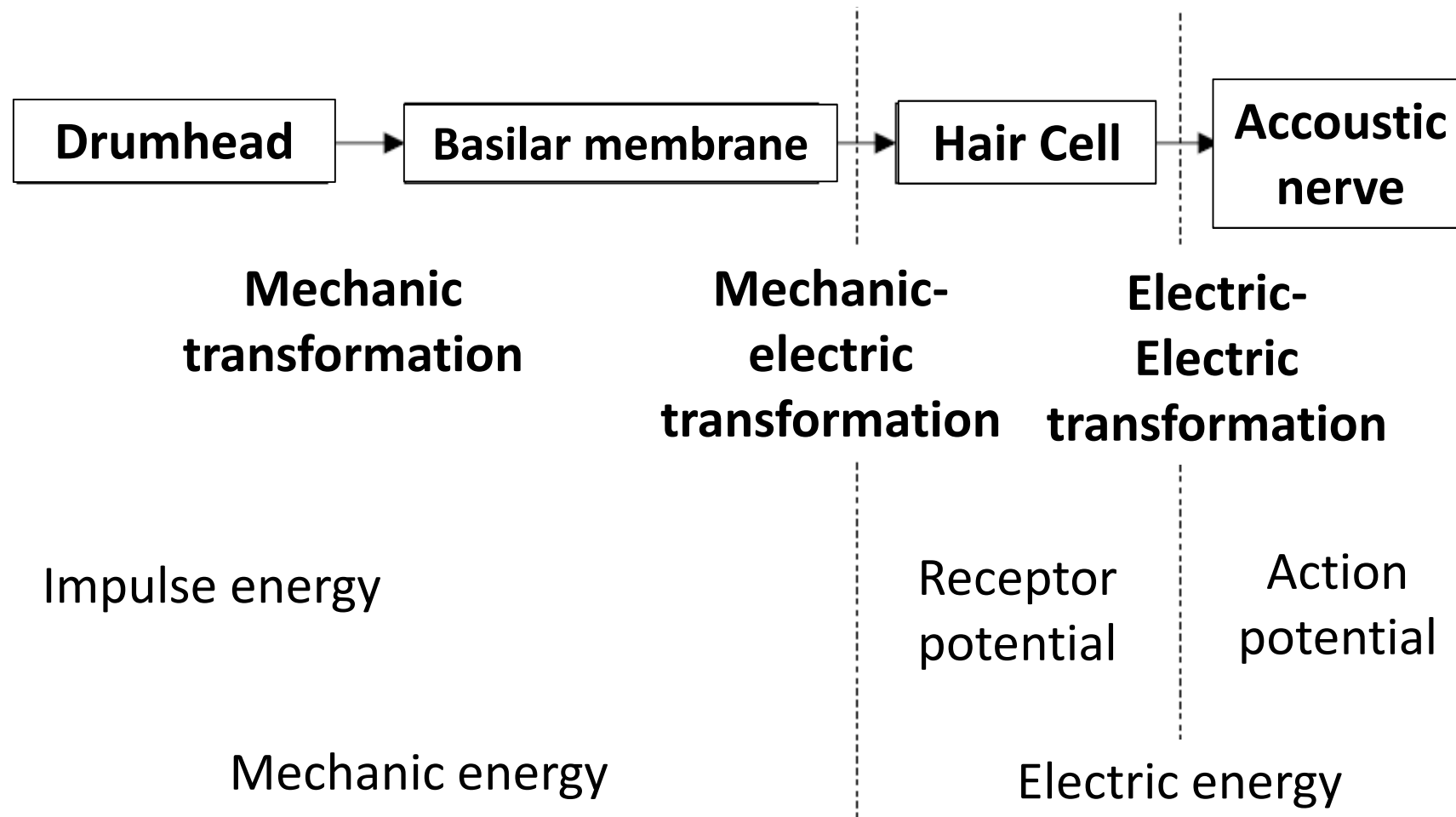
Bypass street
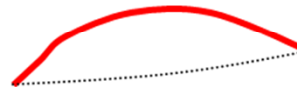
INDICATORS	TIME	SPACE
Traffic volume Speed, Travel time **emissions**	status-quo, linear prognoses	**Local project**

Umfahrungstrasse

Trasse
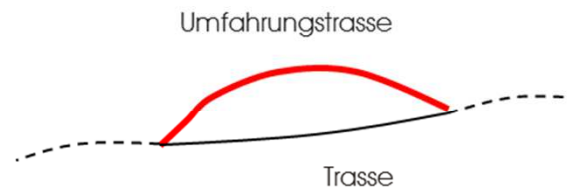
INDICATORS	TIME	SPACE
Traffic volume Speed, Travel time **air concentrations**	status-quo, linear prognoses	**Corridor**

Bypass

railway

Surrounding network

Capacity border		
Time		
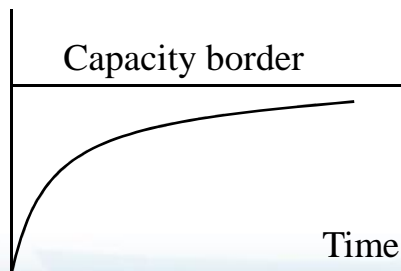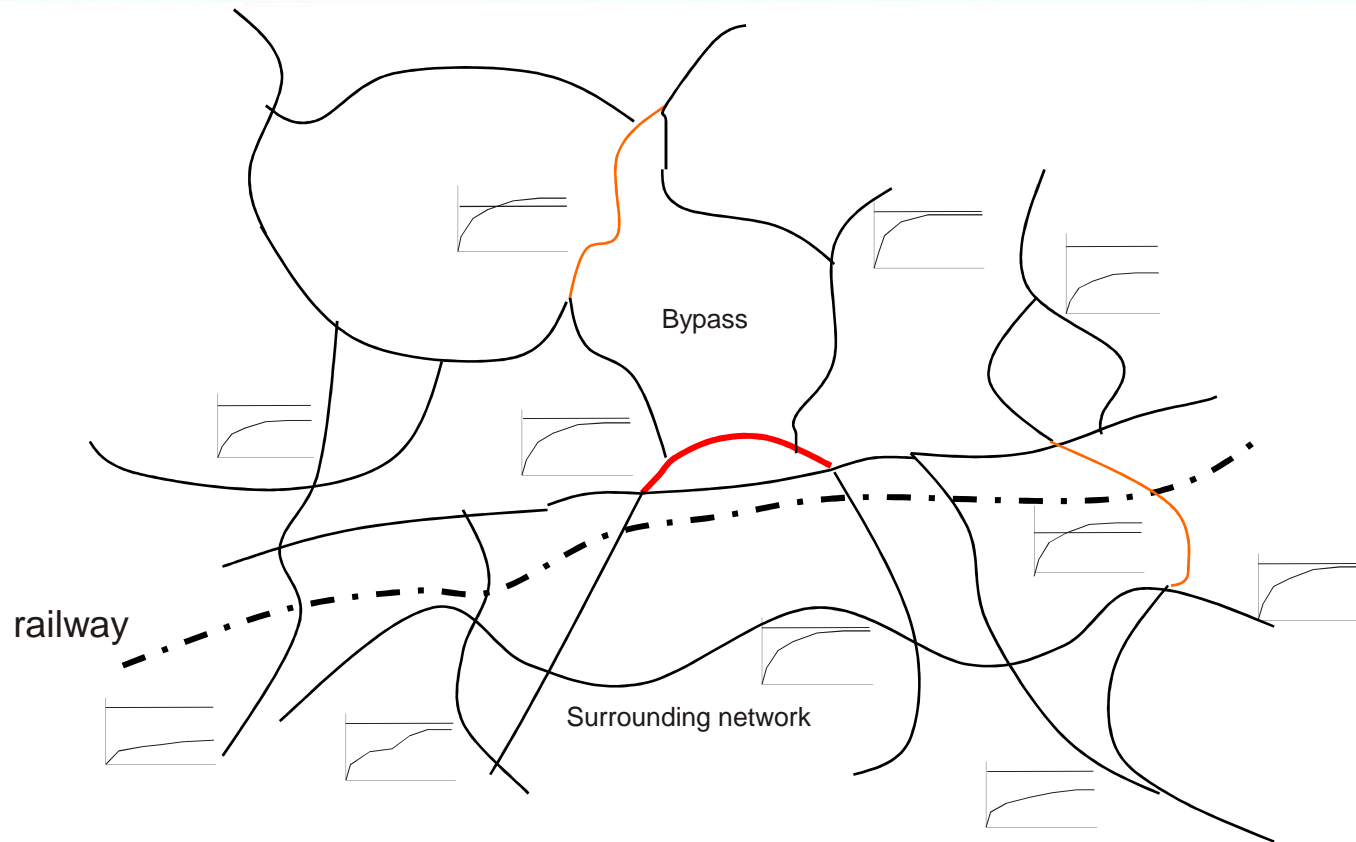
INDIKATORS	Time	Space
Modal-split **Air concentrations**	Szenarios	**Distribution of trip lenghts**, „ecologic footprint"

UV   UV

Ozone
Nitrogen oxid
Peroxid
Oxidatien

Nitrogen monoxid
Nitrogen dioxid
Hydrocarbon
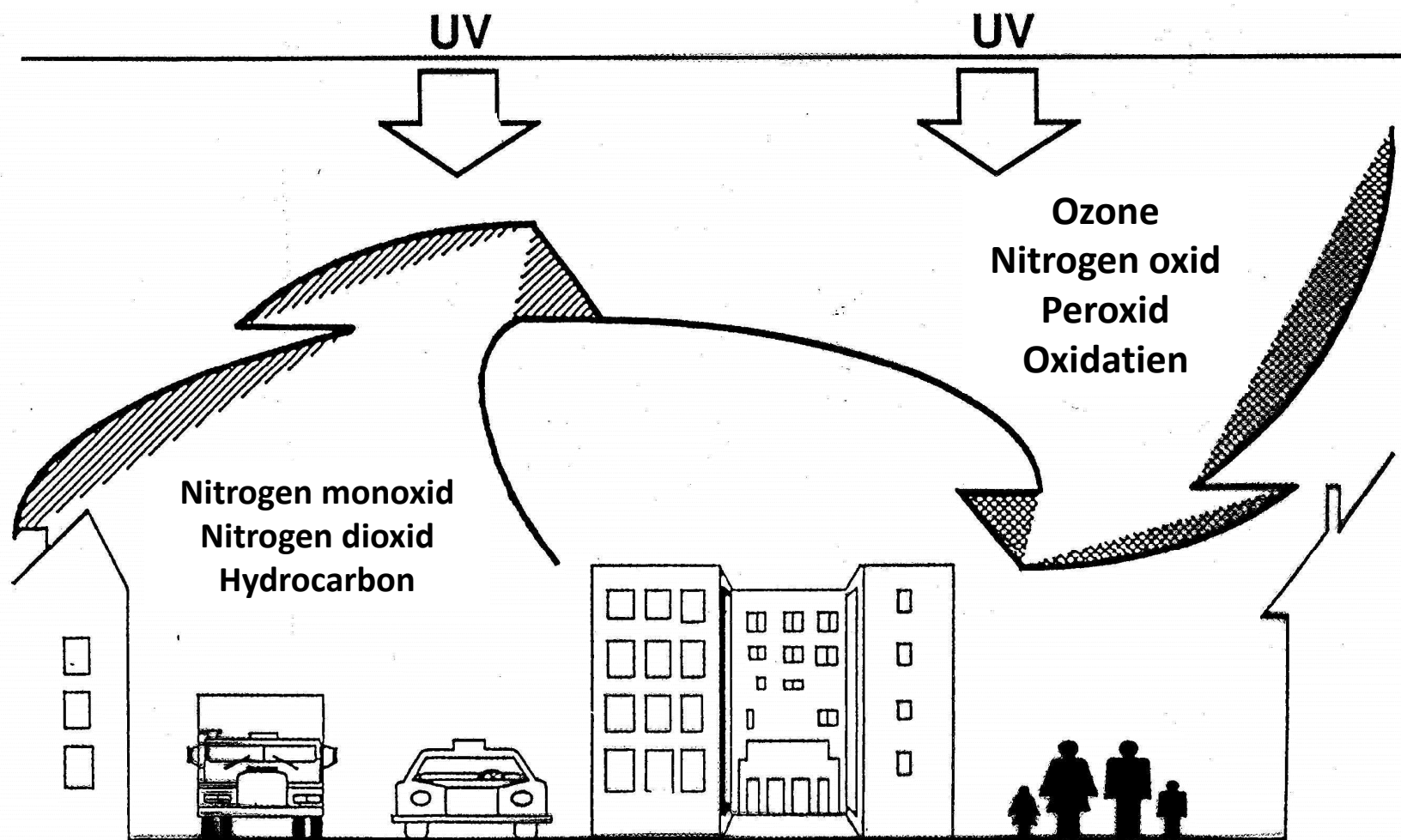
PiSe–8)

Source: Urban Mobility; Indonesia in Brief; Samsi Gunarta, Natalia Tanan, Gede Budi Suprayoga

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Air Quality Index (AQI)	PM2.5 Health Effects Statement	PM 2.5 Cautionary Statement
Good (0-50)	PM2.5 air pollution poses little or no risk.	None
Moderate (51-100)	Unusually sensitive individuals may experience respiratory symptoms.	Unusually sensitive people should consider reducing prolonged or heavy exertion.
Unhealthy for Sensitive Groups (101-150)	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
Unhealthy (151-200)	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion; everyone else should reduce prolonged or heavy exertion.
Very Unhealthy (201-300)	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in general population.	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.
Hazardous (301-500)	Serious aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; serious risk of respiratory effects in general population.	Everyone should avoid all physical activity outdoors; people with heart or lung disease, older adults, and children should remain indoors and keep activity levels low.

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Angriffsorte	Luftschadstoffe
Nasen-Rachenraum	5-10 µm
Luftröhre	3-5 µm
Bronchien	2-3 µm
Bronchiolen	1-2 µm
Alveolen (Lungen-bläschen)	0.1-1 µm
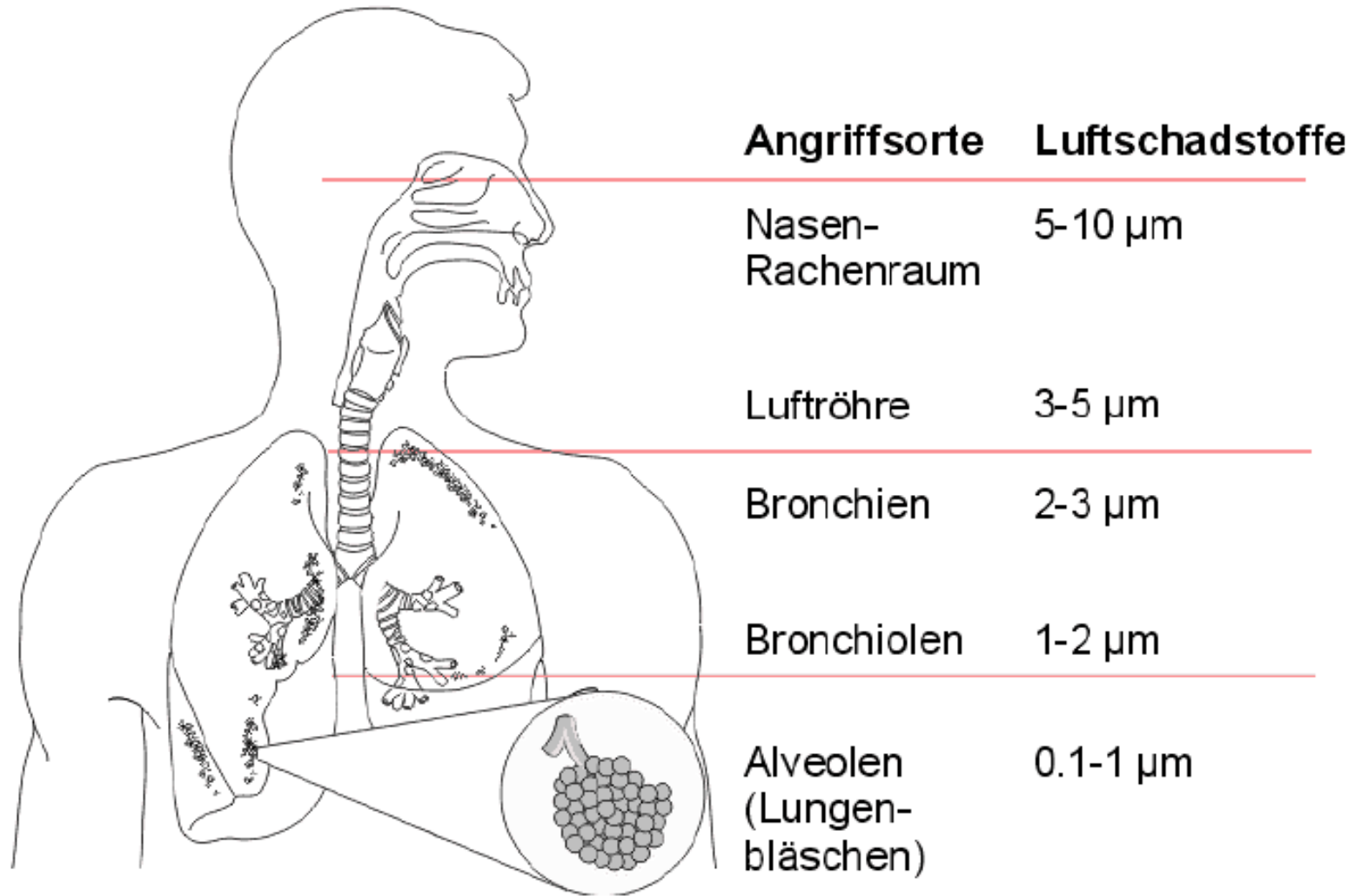
Deposit of particulate matter in human upper respiratory trakt

Figur 9: Ablagerung von Feinstaub im menschlichen Atemtrakt

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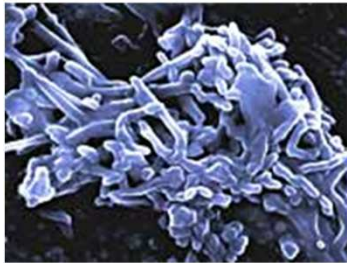
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	Durchmesser/mm	Länge/mm
Trachea	15 – 22	100 – 120
Hauptbronchus	10 – 15	30 – 50
Lappenbronchus	7 – 8	15 – 25
Segmentbronchus	5 – 6	10 – 20
Subsegmentbronchus	4 – 5	8 – 10
Bronchiolus lobularis	0,6 – 1	2 – 3
Bronchiolus terminalis	0,6	1,5 – 2
Bronchiolus respiratorius	0,5	0,9 – 1,5
Ductus alveolaris	0,4	0,7 – 0,9
Alveole	0,2 – 0,3	

Lungenlappen

Segment

Prälobulus

Lobulus

Azinus

Schädlicher Feinstaub

Je nach Partikelgröße gelangt Staub mit der Atemluft unterschiedlich tief in die Luftwege
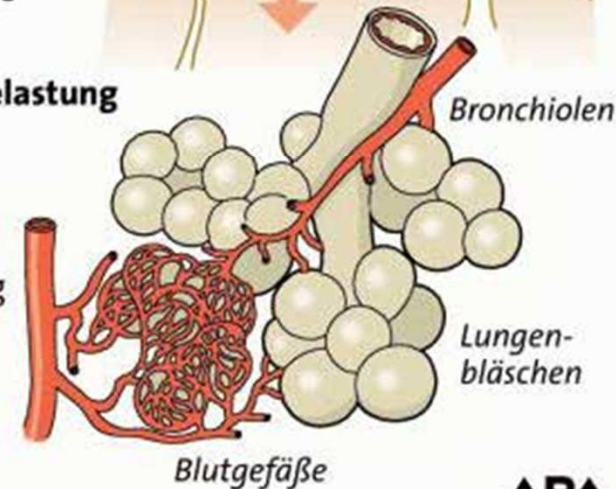
Größere Teilchen (z.B. Pollen)

Bleiben in den oberen Atemwegen (Nase, Luftröhre, Kehlkopf) hängen

Feinstaub – unter 10 Mykrometer

Gelangt tief in die unteren Atemwege (Bronchien, Bronchiolen und Lungenbläschen), schädigt die Schleimhaut

Mögliche Folgen bei Dauerbelastung

- Asthma
- Bronchitische Symptome (Schleim, Husten)
- Verengung/Verkrampfung der Atemwege
- Erhöhte Anfälligkeit für Infektionen
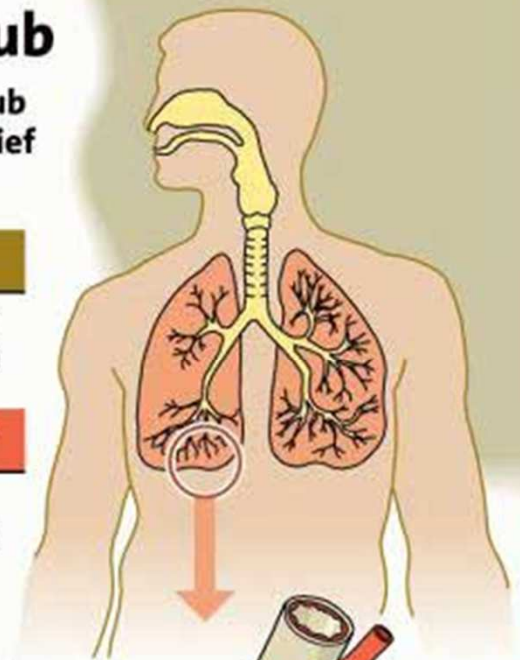
Bronchiolen

Lungenbläschen

Blutgefäße

Grafik: © APA, Quelle: APA

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Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)

Background

Ambient air pollution is suspected to cause lung cancer. We aimed to assess the association between long-term exposure to ambient air pollution and lung cancer incidence in European populations.

Methods

This prospective analysis of data obtained by the European Study of Cohorts for Air Pollution Effects used data from 17 cohort studies based in nine European countries. Baseline addresses were geocoded and we assessed air pollution by land-use regression models for particulate matter (PM) with diameter of less than 10 μm (PM_{10}), less than 2·5 μm ($PM_{2.5}$), and between 2·5 and 10 μm (PM_{coarse}), soot ($PM_{2.5absorbance}$), nitrogen oxides, and two traffic indicators. We used Cox regression models with adjustment for potential confounders for cohort-specific analyses and random effects models for meta-analyses.

Findings

The 312 944 cohort members contributed 4 013 131 person-years at risk. During follow-up (mean 12·8 years), 2095 incident lung cancer cases were diagnosed. The meta-analyses showed a statistically significant association between risk for lung cancer and PM_{10} (hazard ratio [HR] 1·22 [95% CI 1·03–1·45] per 10 μg/m^3). For $PM_{2.5}$ the HR was 1·18 (0·96–1·46) per 5 μg/m^3. The same increments of PM_{10} and $PM_{2.5}$ were associated with HRs for adenocarcinomas of the lung of 1·51 (1·10–2·08) and 1·55 (1·05–2·29), respectively. An increase in road traffic of 4000 vehicle-km per day within 100 m of the residence was associated with an HR for lung cancer of 1·09 (0·99–1·21). The results showed no association between lung cancer and nitrogen oxides concentration (HR 1·01 [0·95–1·07] per 20 μg/m^3) or traffic intensity on the nearest street (HR 1·00 [0·97–1·04] per 5000 vehicles per day).

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WHAT IS THE CLEAN AIR FOR EUROPE (CAFE) PROGRAMME?

The activities of the European Commission to implement the Sixth EAP currently take place within the Clean Air for Europe (CAFE) programme. This programme of technical analysis and policy development will lead to the adoption of a thematic strategy on air pollution under the Sixth EAP. The major elements of the CAFE programme are outlined in Communication COM(2001)245 (2). The programme, launched in early 2001, aims to develop long-term, strategic and integrated policy advice to protect against significant negative effects of air pollution on human health and the environment.

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WHAT IS THE ROLE OF WHO?

WHO has in recent years investigated and reviewed the effects of different environmental hazards on human health. The European Centre for Environment and Health of WHO's Regional Office for Europe has in particular investigated the health effects of ambient air pollution. The Regional Office published *Air quality guidelines for Europe* (AQG) in 1987 (3) and an updated second edition in 2000 (4). The aim of these guidelines is "… to provide a basis for protecting public health from adverse effects of air pollutants and for eliminating, or reducing to a minimum, those contaminants of air that are known or likely to be hazardous to human health and wellbeing" (4).

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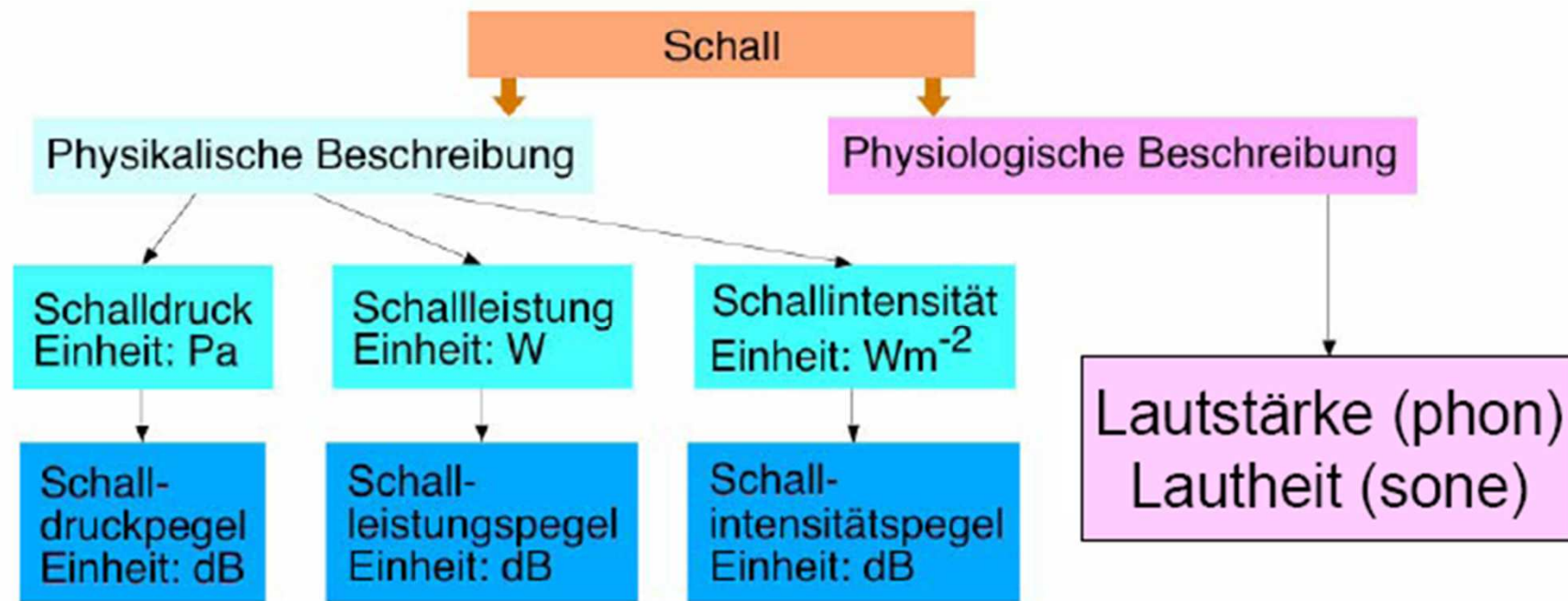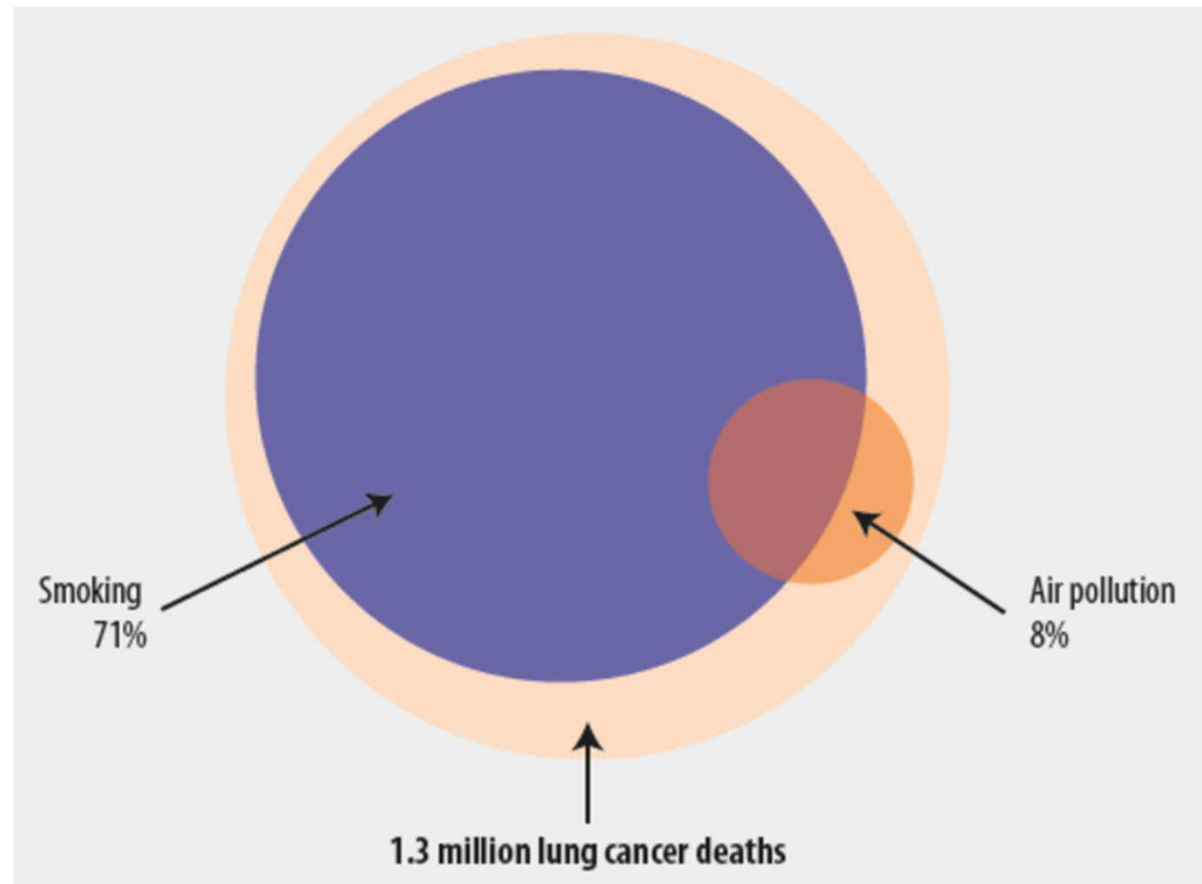
WHAT ARE THE OVERALL TARGETS FOR CLEAN AIR POLICY?

In July 2002 the European Parliament and the Council adopted Decision 1600/2002/EC on the Sixth Community Environment Action Programme (Sixth EAP). This Programme sets out the key environmental objectives to be attained in the European Community. It also establishes, where appropriate, targets and timetables for meeting these objectives. One of the objectives of the Sixth EAP (Article 2) is to establish "... a high level of quality of life and social well being for citizens by providing an environment where the level of pollution does not give rise to harmful effects on human health ..." (*1*). In Article 7, objectives and priority areas for action on environment and health and quality of life are further specified. It states that the objectives – including achieving levels of pollution that do not give rise to harmful effects on human health – "should be pursued ... taking into account relevant World Health Organization (WHO) standards, guidelines and programmes" (*1*).

European Community targets for air pollution – no significant negative effects on health

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Smoking
71%

Air pollution
8%

1.3 million lung cancer deaths

(Deaths that would have been prevented by removing either exposure are represented by the area where the inner circles overlap)

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