

Für Mensch & Umwelt

Methodological Convention 2.0 for Estimates of  
Environmental Costs of the Federal Environment Agency,  
Germany

# Carbon Value, discounting, uncertainty

Kilian Frey

Section I 3.1 / Environment and Transport

Dr. Björn Bünger

Section I 1.4 / Economic and social environmental issues, sustainable  
consumption

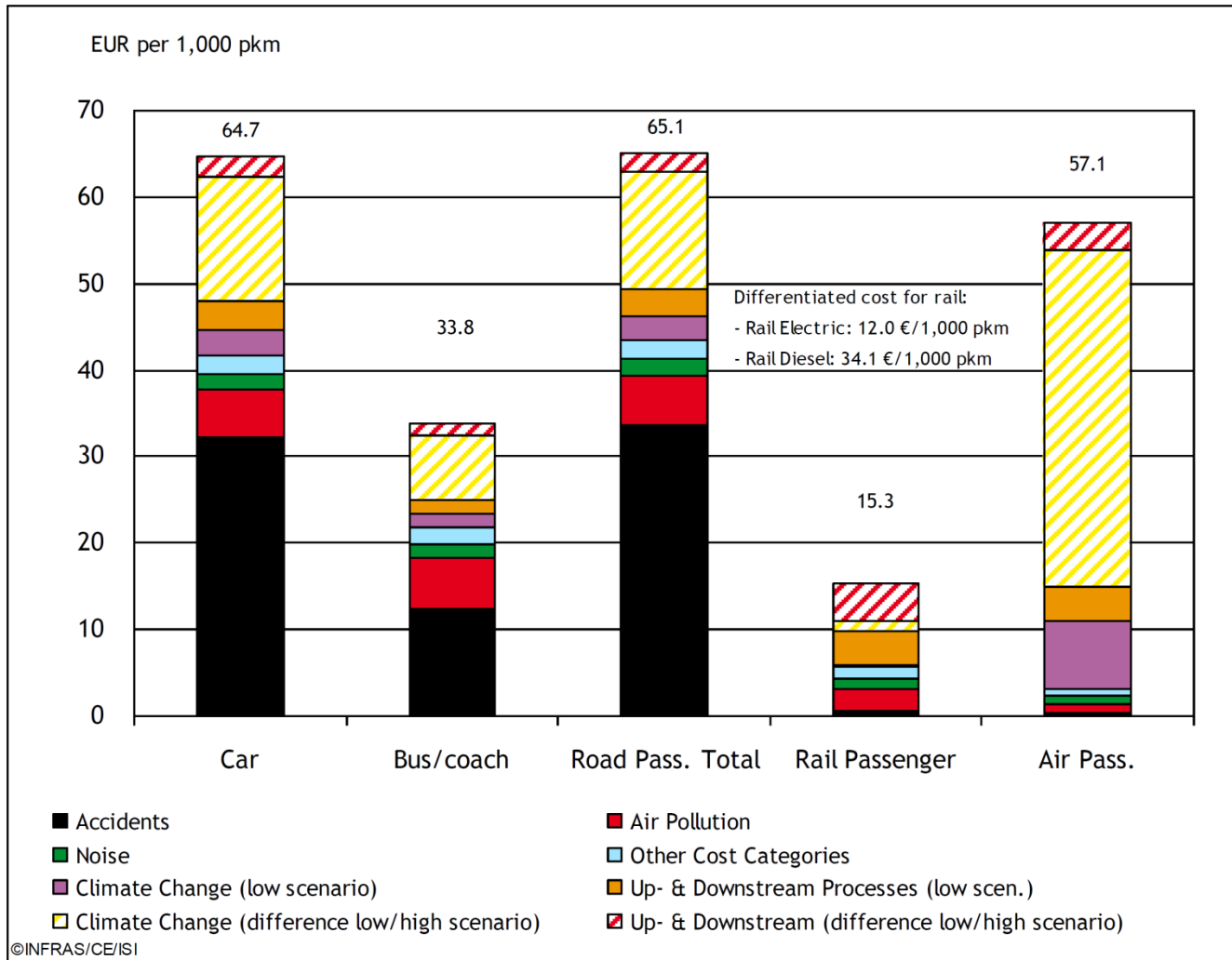
## outline

**1 CARBON VALUE**

**2 DISCOUNTING**

**3 UNCERTAINTY**

# Average external costs 2008 for EU-27\*: passenger transport (excluding congestion)



Other cost categories: Costs for nature & landscape, biodiversity losses (due to air pollution), soil and water pollution costs, additional costs in urban areas. Data do not include congestion costs.

\* Data include the EU-27 with the exemption of Malta and Cyprus, but including Norway and Switzerland.

# 1 Carbon Value - Why carbon value?

## WHY VALUING IN MONETARY VALUES?

→ making different costs comparable (within climate policy but also between different types of public policy interventions – all decisions), allowing cost benefit analysis,

Where is carbon emitted in the transport sector?

- Vehicles
- Infrastructure

→ Life Cycle Approach: Not only operational phase but also building, maintaining and disposal

## Damage Costs (SCC) vs. Avoidance/Abatement costs

### **BASICALLY TWO DIFFERENT APPROACHES:**

Social Costs of Carbon (SCC)/Damage costs

→ How much damage is done by the impact of the Carbon emission

Abatement/Avoidance Costs

→ How much does it cost to avoid the activity that emits „too much“ tons of Carbon?

(= that is more than agreed on by society)

## Damage Costs (SCC) vs. Avoidance/Abatement costs

### **BASICALLY TWO DIFFERENT APPROACHES:**

→ While abatement costs (avoidance costs) are a good indicator of adaptation costs or opportunity costs that have to be borne by the economy to achieve a specific target, they do not give any indication of the extent of the damage.

→ Neither can they be used for cost-benefit analyses.

→ Here it is necessary to fall back on **damage costs**.

## Suggestions of the Methodological Convention: damage costs

	Climate costs in € <sub>2010</sub> / t CO <sub>2</sub>		
	Short term 2010	Medium term 2030	Long term 2050
Minimum figure	40	70	130
Average figure	80	145	260
Maximum figure	120	215	390

## Why 80 €?

- To estimate the climate damage costs of CO<sub>2</sub> the research project that led to UBA's methodological Convention 2.0 reviewed several studies on the estimation of damage costs
- It became apparent that the recommendation of the methodological convention 1.0 of 70 EUR (2000 value) is still valid in the order of magnitude.
- When correcting for inflation the amount of 80 EUR (2010 value) therefore is deemed appropriate.



## Modes of transport: costs of specific emissions CO2

Cost rates, transport [€-cent <sub>2010</sub> /vehicle kilometre]		Urban	Rural	Motorways	average
Cars (Fleet 2010)	Diesel	1,4	1,0	1,2	1,2
	Petrol	1,5	1,2	1,6	1,4
HGVs (Fleet 2010)	Light comm. (diesel)	1,7	1,6	2,0	1,7
	Light comm. (petrol)	1,6	1,3	1,6	1,5
	HGV (diesel)	5,4	5,1	5,6	5,4
Bus (fleet 2010)	Diesel	8,7	6,2	5,6	7,0
Motorcycles (fleet 2010)	MC (petrol, 4-stroke)	0,8	0,8	1,1	0,9
	MC (petrol, 2-stroke)	0,5	0,6	1,0	0,7
Passenger train	Diesel	29,2	29,2	---	29,2
	Electric	49,7	49,7	---	49,7
Freight train	Diesel	93,0	93,0	---	93,0
	Electric	98,9	98,9	---	98,9

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## II Discounting - Why discounting

**→ COSTS AND BENEFITS THAT ARISE IN DIFFERENT POINTS OF TIME CAN BE MADE COMPARABLE BY DISCOUNTING**

→ Are benefits or costs that exist today comparable to those that will exist in twenty years, in hundred years?

## Discount rate

### **SOME IMPORTANT FACTORS:**

- time preference rate (Individuum vs. Society):
  - >Individuum normally has  $tpr > 0$
  - >  $0 =$  equal value all generations (“spirit of sustainability”)
- Economic growth rate

## Discounting

### Suggestion of the Federal Environment Agency:

- Short to medium term (twenty years):

  - discount rate 3% p. a. (real money market interest rate for low-risk bonds)

- Long term (more than twenty years):

  - Discount rate 1.5% p. a.

  - Discount rate of 0% p. a. sensitivity analysis (for cross-generational considerations)

- constant discount rates

## Discounting

### Suggestion for climate cost calculation:

Due to a conservative estimation of an economic growth rate for the next 100 Years of 1% we do not take discount rate of 1,5 % but:

**In the context of climate costs the Federal Environment Agency calculates with a constant discount rate of 1% p. a.**

### III Uncertainty

-uncertainty of the future - technical advance?

-change of monetary value – inflation?

-Especially important is uncertainty about economic development in the world and its connection to carbon emissions

## How to cope with uncertainty?

- In Principle: expected value of damage should be used for valuation of environmental costs

- In presence of risk aversion:

- expected value of damage = lower limit of cost

→ Risk factors (e.g. from Katarisk study from Suisse)

→ sensitivity analyses

Recommendation for carbon value sensitivity analyses



Thank you very much for  
your attention

**Kilian Frey/ Dr. Björn Bünger**

kilian.frey@uba.de

Bjoern.buenger@uba.de

<http://www.umweltbundesamt.de/en>

## Main Sources:

Umweltbundesamt [German Federal Environment Agency] (2012), Economic Valuation of Environmental Damage – Methodological Convention 2.0 for Estimates of Environmental Costs

→ Main text: Measures and procedures to value environmental costs

→ Appendix A: Methods on estimating willingness-to-pay, Benefit Transfer

→ Appendix B: Best practice Cost Rates for air pollutants, transport, power and heat generation