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Nutzen-Kostenbetrachtungen zu Maßnahmen im Mobilitätsbereich

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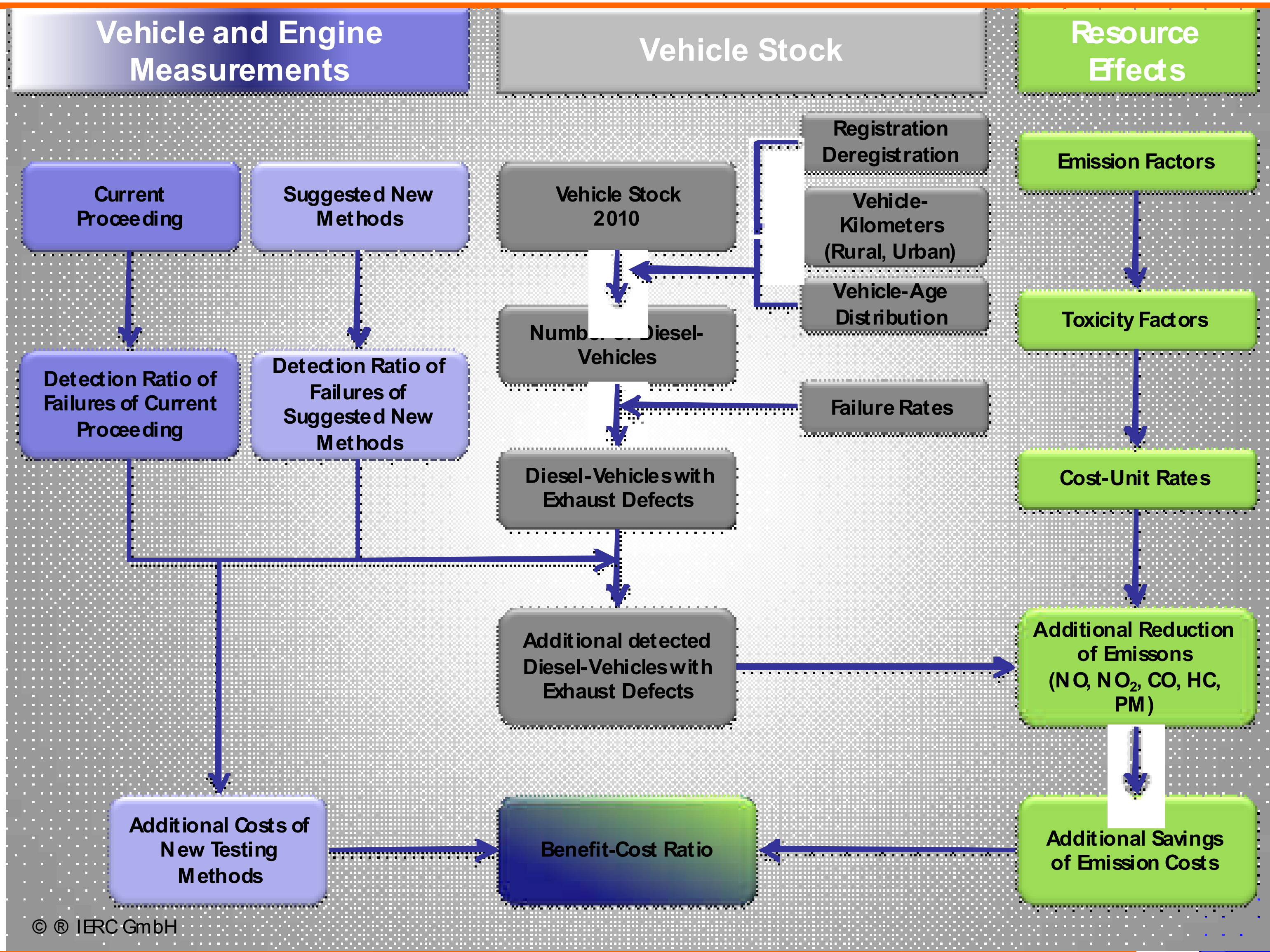
Content

- Soll die Dieselpartikelmessung technologisch verbessert werden? Ergebnisse des Teddie-Projekts.
- Sind Minimum-Regulierungen effizient? Das Beispiel der EU-Direktive 96/96/EC.

Teddie-Berechnungsmodell



Benefits Results

Defect	Probability	Benefits in million euro per year for each defect with a theoretical probability of 1 per defect	Average benefits in million euro per year for each defect weighted by the empirical probability
DPF Defect: Case 1	0,80	1051,3	841,0
Crankcase breather removed: Case 2	0,20	17,3	3,4
Air mass flow meter manipulated: Case 3	0,05	-6,1	-3,1
DOC fault: Case 4	0,30	39,5	11,9
DOC removed: Case 5	0,30	4,1	1,2
DOC removed, unloaded DPF: Case 6	0,50	11,4	5,7
SCR catalyst aged: Case 7	0,30	1,5	0,5
SCR catalyst damaged: Case 8	0,20	1	0,2
Total	--	1120,4	860,8

Main Assumptions

- The empirical data on the emission reductions which could be achieved were derived for the five vehicles tested in TEDDIE. These five vehicles were considered to be broadly representative of Euro 5/6 technologies in terms of their response to faults.
- Vehicle 1 was assumed to represent 40% of the European diesel passenger car fleet. Vehicles 2, 3, 4 and 5 were taken to represent 30%, 10%, 10%, and 10% of the fleet respectively.
- Emissions of CO, HC, NO and NO_2 were transformed using toxicity factors into NO_x-equivalents. The toxicity factors were: HC 1,5; CO 0,003; NO and NO_2: 1.

The calculation of benefits was based on following cost unit rates for 2010:

- NO_x-equivalent: 4.680 euro per tonne.
- PM: 92.546 euro per tonne.

Benefit-Cost Ratio: Replacement of testing devices at once

For the first case the following were assumed:

•The market price (without tax) of the equipment was 5.000 euro. The market price regularly has to be lowered by the profit margin. For this calculation a conservative approach was used, and no profit reduction was included.

•The depreciation period was 5 years.

•The market interest rate was set to 5%.

•80.000 testing devices were needed (CITA, 2006; Nolte, 2010).

•The total annual cost of such a strategy to replace the devices immediately was found to be 92,4 million euro, and the benefit/cost ratio was 9.

Benefit-Cost Ratio: replacement by depreciation cycle

For the second case the following assumptions were made:

- The price difference between old and new devices was 1.000 euro.
- The depreciation period was 5 years.
- The market interest rate was 5%.
- 16.000 testing devices per year would have to be replaced over five years.
- The inflation rate was 2% per year.
- The total annual cost of this strategy was found to be 22,2 million euro per year, and the benefit/cost ratio was 39.

Policy Recommendation

- For each tested diesel car a benefit of 20 euro could be achieved. Other criteria apart, this benefit would be sufficient to allow an immediate regulatory switch to the new roadworthiness emission test.
- A strategy to replace opacity measurement devices immediately was found to have a cost of 92 million euro, and a benefit/cost ratio of 9. Implementation of this strategy would also be justified.
- A strategy to replace opacity measurement devices over a five-year period was found to have a cost of 22 million euro, and a benefit/cost ratio of 39. Implementation of this strategy would also be justified and preferable.
- The sensitivity analysis showed that the vehicles which were selected would be broadly representative of Euro 5/6 technologies.

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Starting Point:
Passenger Car Inspection Test Cycles in the EU-27 (2011)

		Year after start of operation of vehicle										
		1	2	3	4	5	6	7	8	9	10	...
Belgium	BE				S	T	T	T	T	T	T	T
Denmark	DK				S		T		T			
Germany	DE			S		T		T		T		
Greece	EL				S		T		T		T	
Spain	ES				S		T		T		T	T
France	FR				S		T		T		T	
Ireland	IE				S		T		T			
Italy	IT				S		T		T			
Luxembourg	LU			S	T	T	T	T	T	T	T	T
Netherlands	NL			S	T	T	T	T	T	T	T	T
Austria	AT			S		T	T	T	T	T	T	T
Portugal	PT				S		T		T	T	T	T
Finland	FI			S		T	T	T	T	T	T	T
Sweden	SE			S		T	T	T	T	T	T	T
United Kingdom	UK			S	T	T	T	T	T	T	T	T
Cyprus	CY	n.a.										
Czech Republic	CZ				S		T		T		T	
Estonia	EE			S		T		T		T	T	T
Hungary	HU	S			T			T		T		T
Latvia	LV	S	T	T	T	T	T	T	T	T	T	T
Lithuania	LT			S		T		T		T		T
Malta	MT	n.a.										
Poland	PL			S		T	T	T	T	T	T	T
Slovak Republic	SK			S	T	T	T	T	T	T	T	T
Slovenia	SI			S		T		T		T		T
Romania	RO		S		T		T		T		T	
Bulgaria	BG	n.a.										
Directive 96/96/EC					S		T		T		T	

Annotations: S = First inspection after start of operation; T = Next obligatory vehicle inspection after S; n.a. = not available
UK data refer to Great Britain only. **Source:** CITA 2006; CITA 2011; DEKRA 2005; AUTOFORE 2007; Ghimpsuan 2011.

Legal Backround

The relevant legal starting point for the **current inspection regime** of passenger cars is the EU Directive 96/96/EC

(Directive on the approximation of the laws of the Member States relating to roadworthiness tests for motor vehicles and their trailers).

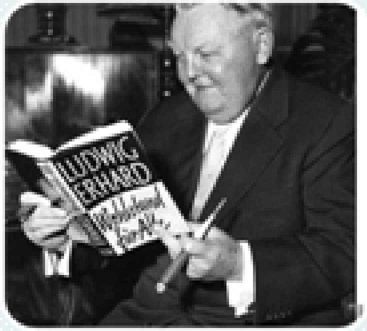
establishes minimum periodic-testing frequencies

current minimum testing periodicity passenger car of 4/2/2/2

Over-Compliance
Belgium, Luxembourg, Netherlands, Austria, Finland, Sweden, Great Britain, Italy, Portugal, Latvia, Poland and Slovak Republic

Minimum-Compliance
Denmark, Germany*, Greece, Spain, France, Ireland, Czech Republic, Estonia*, Hungary**, Lithuania* and Slovenia*

European Commission Interests in Periodical Technical Inspection



Institutional Complexity & Quality Losses

13 different inspection regimes

No systematic mutual recognition of PTI

No standard training of inspectors

Different testing equipment

Competition Impacts

13 different PTI, but 27 different fees

Leasing firms, rental companies have cost disadvantages

Welfare Effects

Environmental problems

Affecting road safety

Road accidents lead to 150 billion € resource losses per year

Quality of live differs between Member States

Administrative Burden

Costs for migrants

Costs for European workers

Insufficient data for policy modelling

Primary Research Objectives

	First research objective	Second research objective
Question	Is the current PTI-regime a best-case?	Should a Member State, which over-performs the 96/96/EC, adjust it´s PTI-regime to the minimum requirement (4-2-2-2…) ?
Way of Answer	Improving marginally the testing frequency	Downgrading marginally the testing frequency
Method	Cost-Benefit Analysis	
Case Study	PTI for passenger cars in Germany	PTI for N1-vehicles in Belgium
Modeling	Without-case 3-2-2-2-2… Marginal change = with-case 3-2-2-1-1…	Without-case 1-1-1-1 Marginal downgrade = with-case 4-1-1-1…

Case Study Belgium: Results

Table 10: Benefit-cost results year 2008

Year 2008	Valued Effects in Million €			Total (Million €)
Benefits	Accident Avoidance	Fatalities	15,8	66,2
		Serious Injuries	34,5	
		Slight Injuries	6,3	
		Only Property Damage	6,0	
	Congestion Avoidance	Fatalities	0,1	
		Serious Injuries	0,2	
		Slight Injuries	1,0	
		Only Property Damage	2,3	
Costs	Inspection Costs		7,6	7,6
Benefit-Cost Ratio				8,7

Source: own calculations

Case Study Germany: Cost-Benefit Results

Table 19: Costs, Benefits and Cost-Benefit Ratio in Million EUR, 2010-2015

Year	Accident-Cost Savings	Congestion-Cost Savings	Overall Benefits	Costs	Cost-Benefit Ratio
2010	602,3	88,7	691,0	506,2	**1,4**
2011	630,6	92,9	723,5	498,0	**1,5**
2012	641,3	94,5	735,8	472,7	**1,6**
2013	671,8	98,9	770,7	464,2	**1,7**
2014	690,1	101,7	791,8	450,9	**1,8**
2015	711,1	104,8	815,9	426,4	**1,9**
Average	**657,9**	**96,9**	**754,8**	**469,7**	**1,7**

Source: own calculations

Policy Recommendation

- Minimum requirement for PTI is insufficient
  - Annual inspection of vehicles older than 7 years leads to benefit-cost ratios higher than 1
- States with over-compliance have a strong tendency to establish the minimum standard due to pressure groups
  - Welfare losses are higher than the inspection cost savings of the pressure groups
- The Current PTI-Cycle reduces economic welfare
- A common obligatory PTI-Cycle for all EU-Member States is required
- Cost-benefit oriented approach to determine the optimal standard