

The ProgTrans/IWW infrastructure cost calculation model - an analysis of three road categories

Cornelia Bange, Gernot Liedtke, 08.10.2011, 11th Infraday, Berlin

INSTITUTE FOR ECONOMIC POLICY RESEARCH (IWW), NETWORK ECONOMICS



Outline

1. **Model premises**
2. **Economic depreciation**
3. **ProgTrans/IWW Model description**
4. **Results**
5. **Conclusion**

Premises

- **Public enterprise**
 - Financing in terms of public market conditions
 - Long-term high-quality and self-financing road infrastructure

- **Market-based sustainability of substance**
 - Concept of economic depreciation
 - Current depreciated values

- **Efficient and fair cost allocation**
 - Static and dynamic efficiency
 - Usage-based, intergenerational and causative fairness

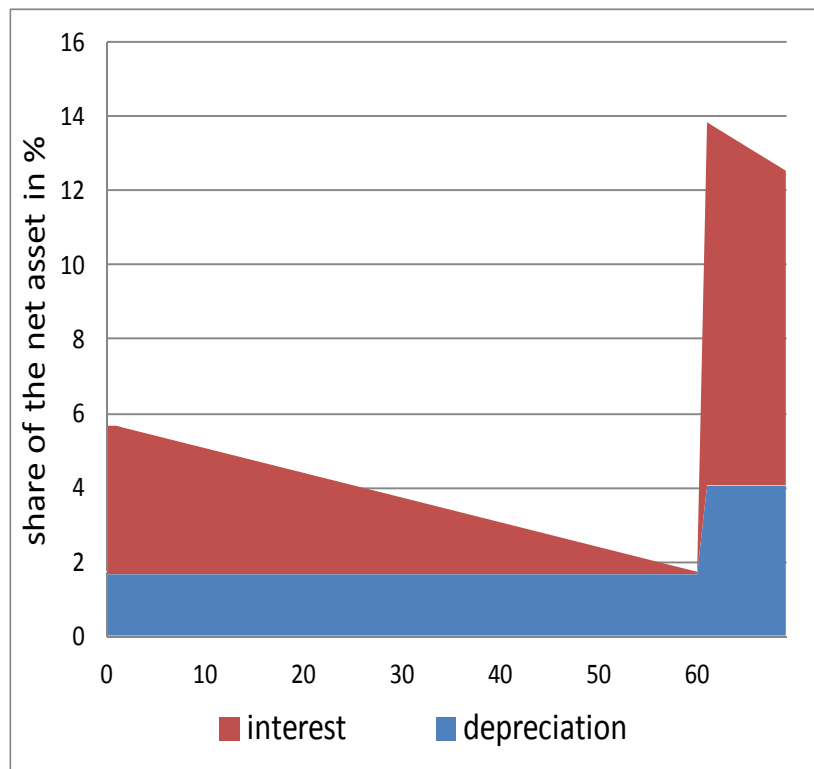
Economic depreciation I

- Open depreciation method
- Gross asset $GA(t)$ evaluated with replacement prices
- $NA(t) = GA(t) * ((T-t)/T)$ = current depreciated value
- $D(t) = NA(t) - NA(t-1) + RI(t)$
- Success neutrality
- Synthetic Method

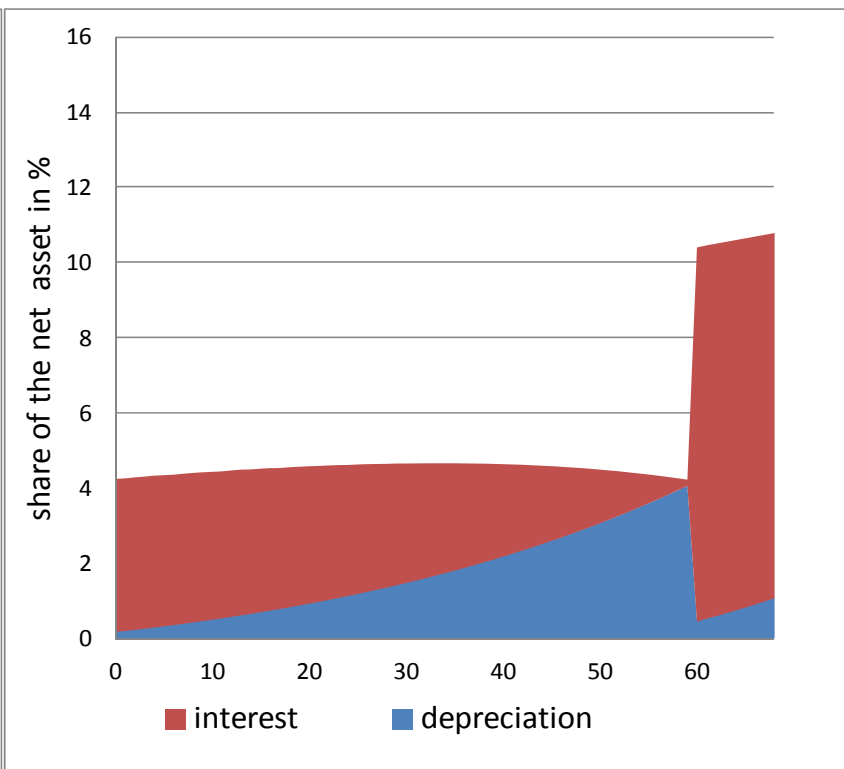
Economic depreciation II

Example: capital costs bridges

Linear depreciation



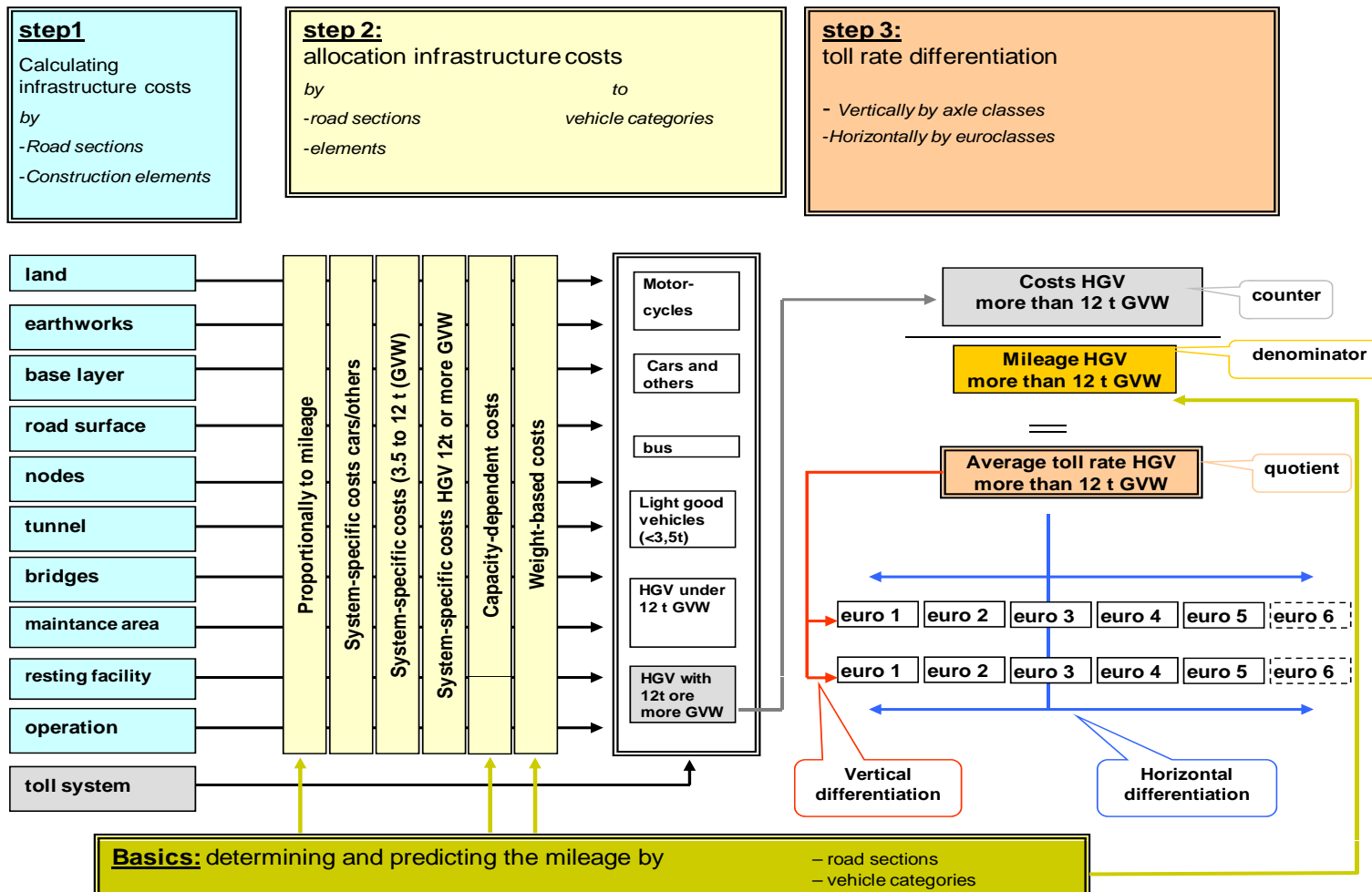
Economic depreciation



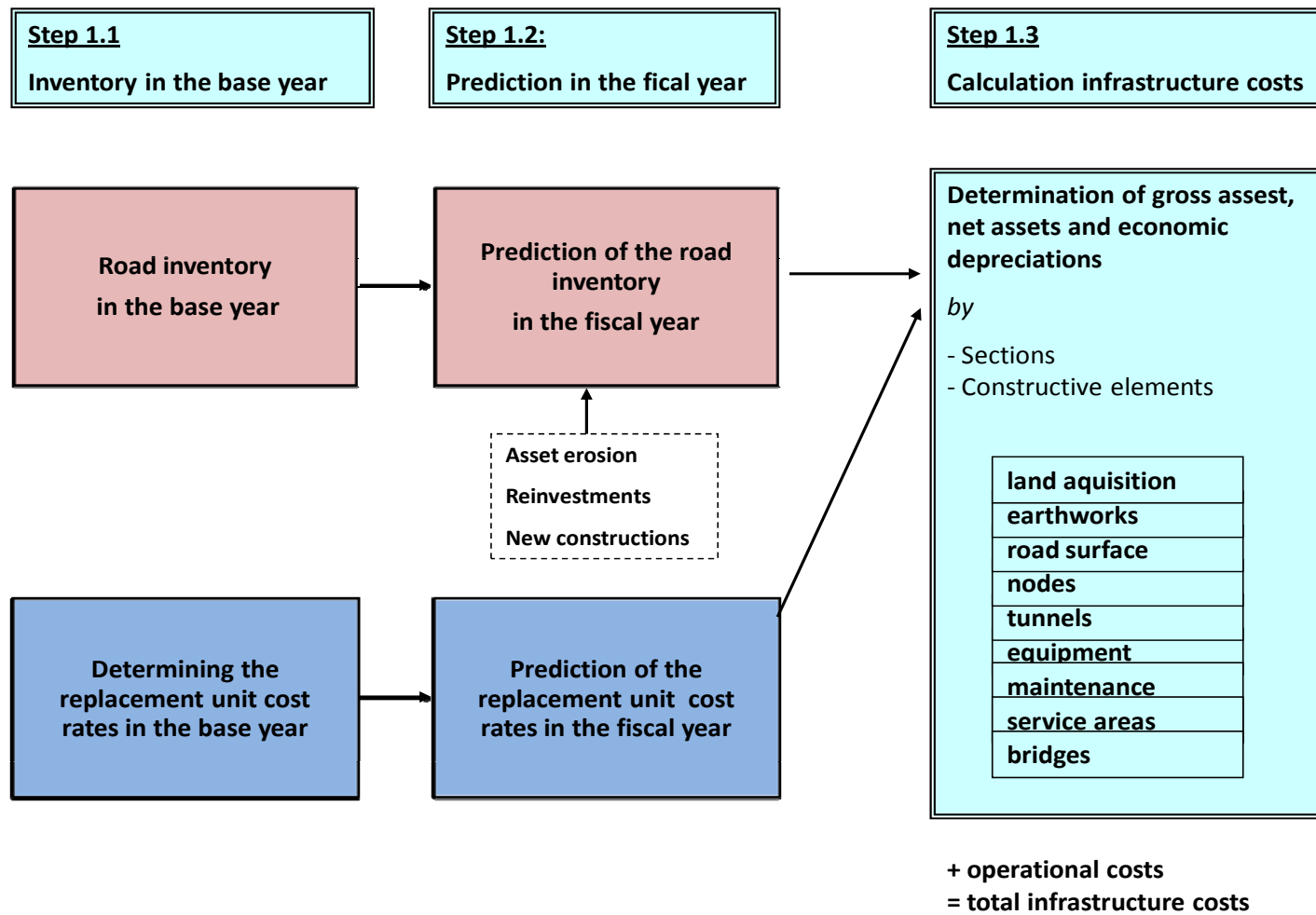
Intergenerational fairness, sustainability of substance

ProgTrans/IWW model description I

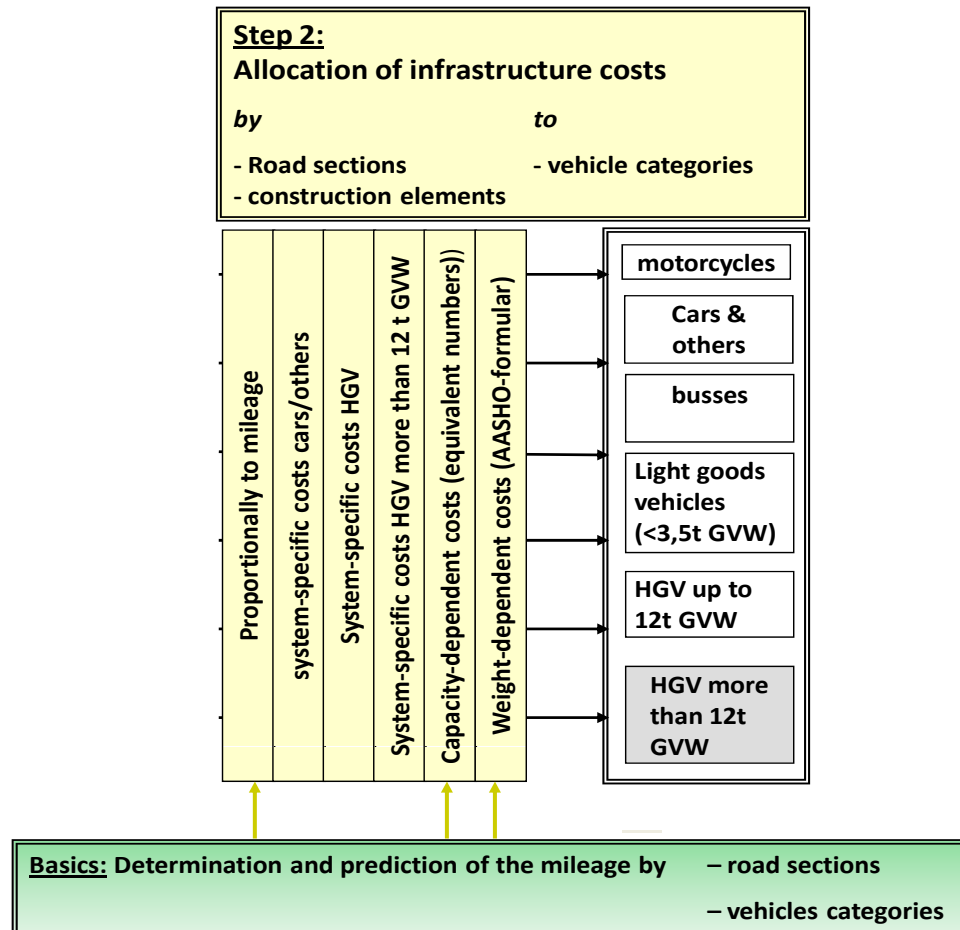
Overview



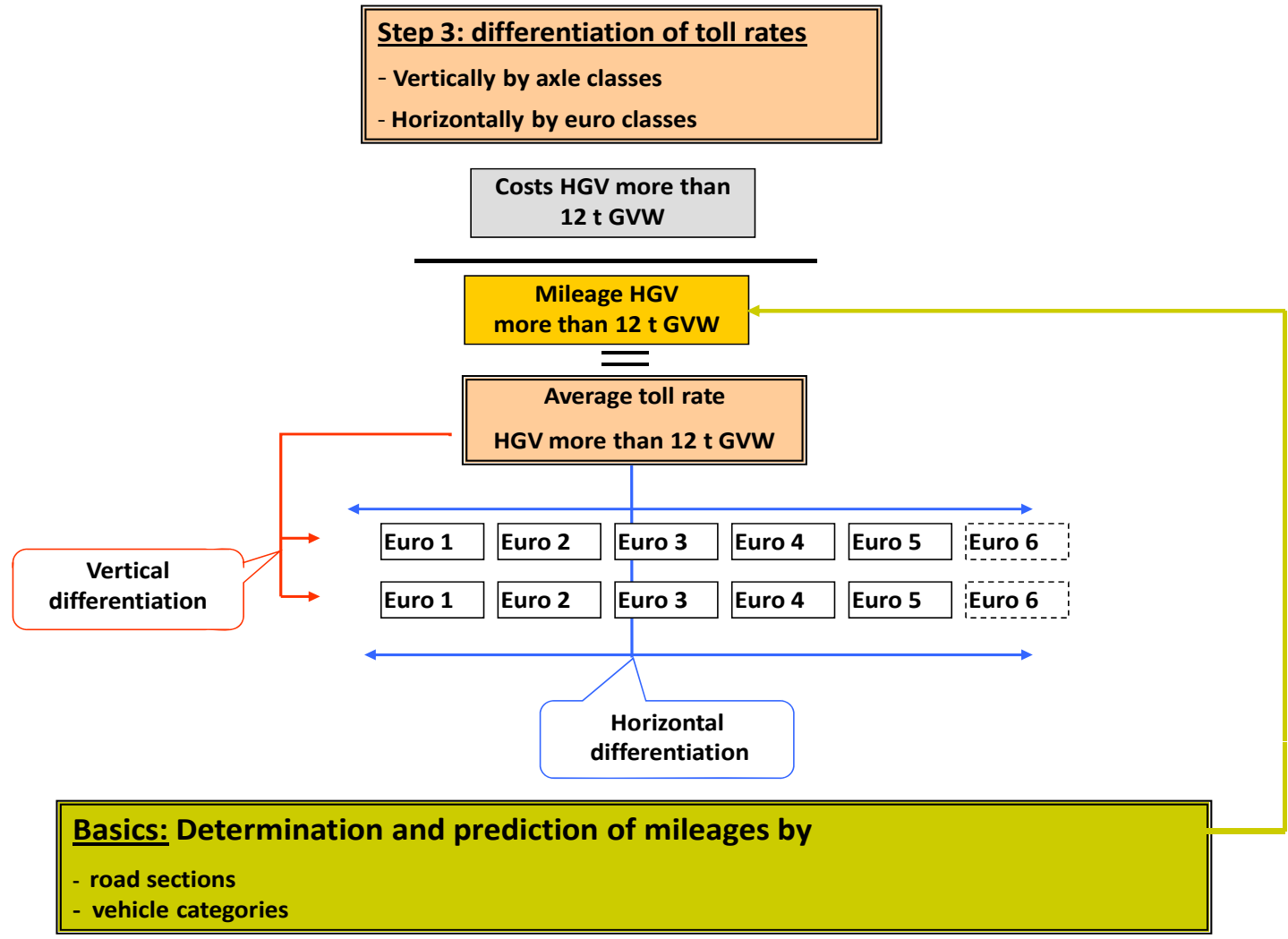
ProgTrans/IWW model description II



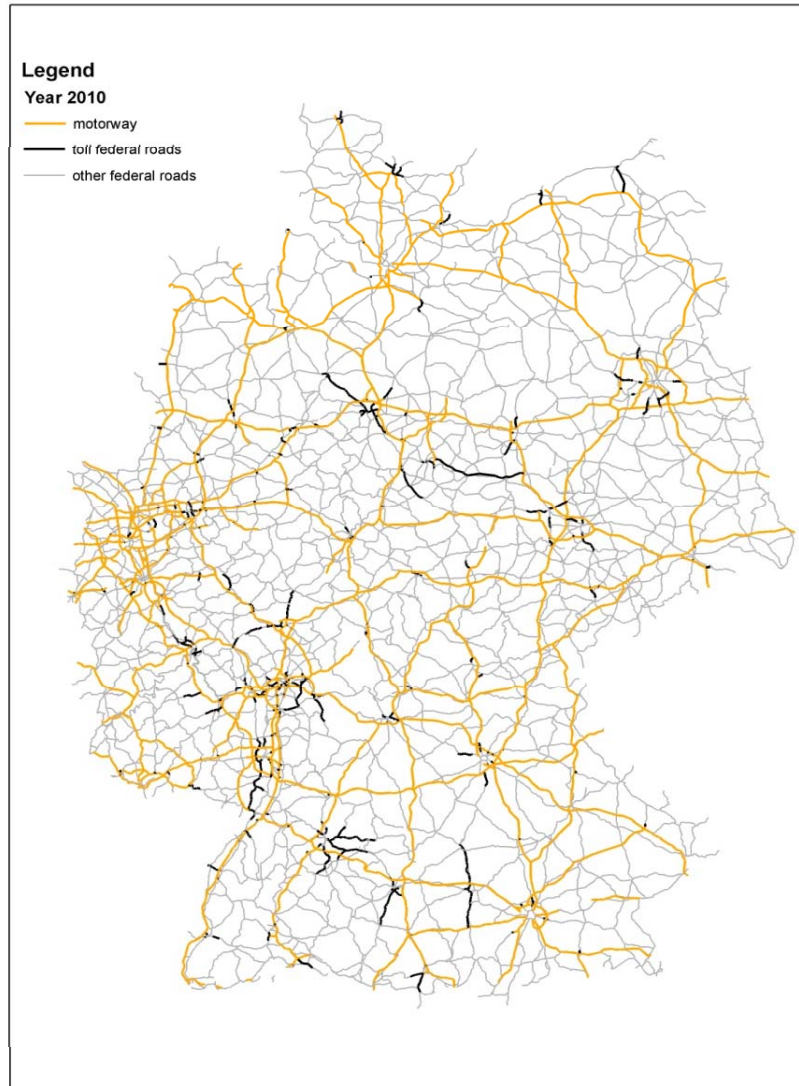
ProgTrans/IWW model description III



ProgTrans/IWW model description IV



Results I

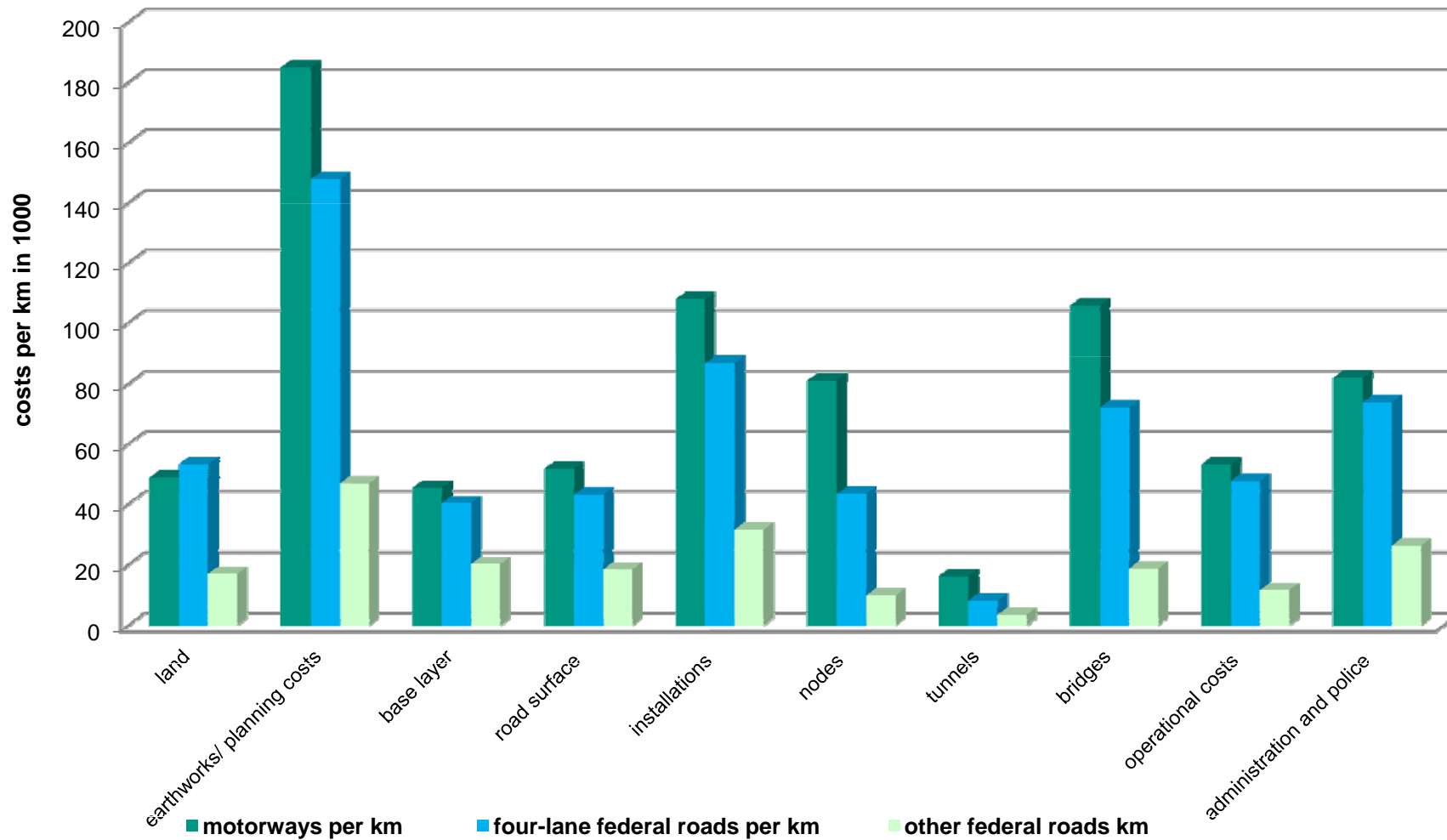


Four-lane federal roads:

- Agglomeration areas like Frankfurt, Stuttgart, Berlin
- Road sections of national-wide relevance

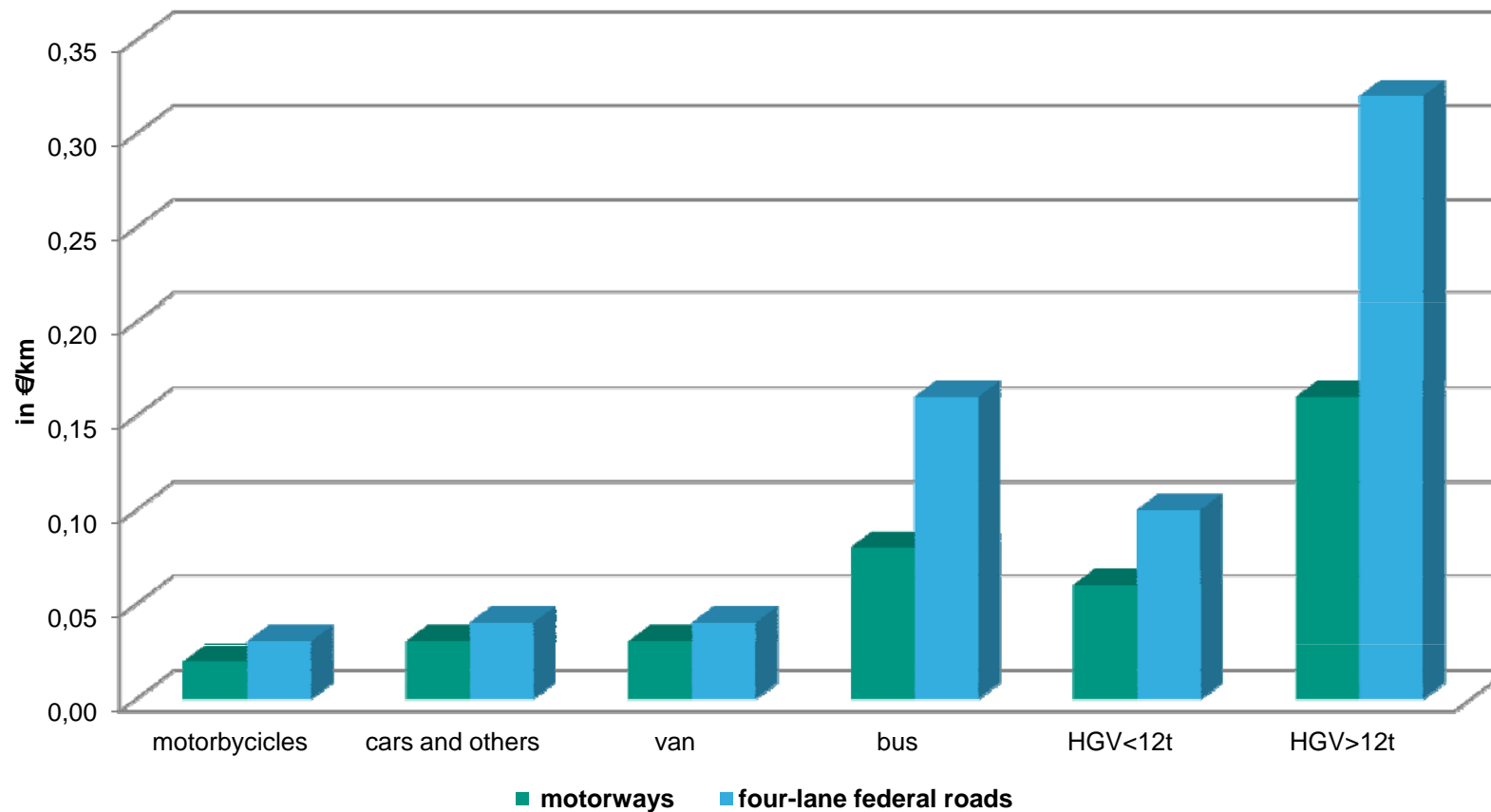
Results II

Costs comparison per km of selected infrastructure elements in 2010



Results III

Average toll rate for different vehicle categories on motorways and four-lane federal roads



Conclusion

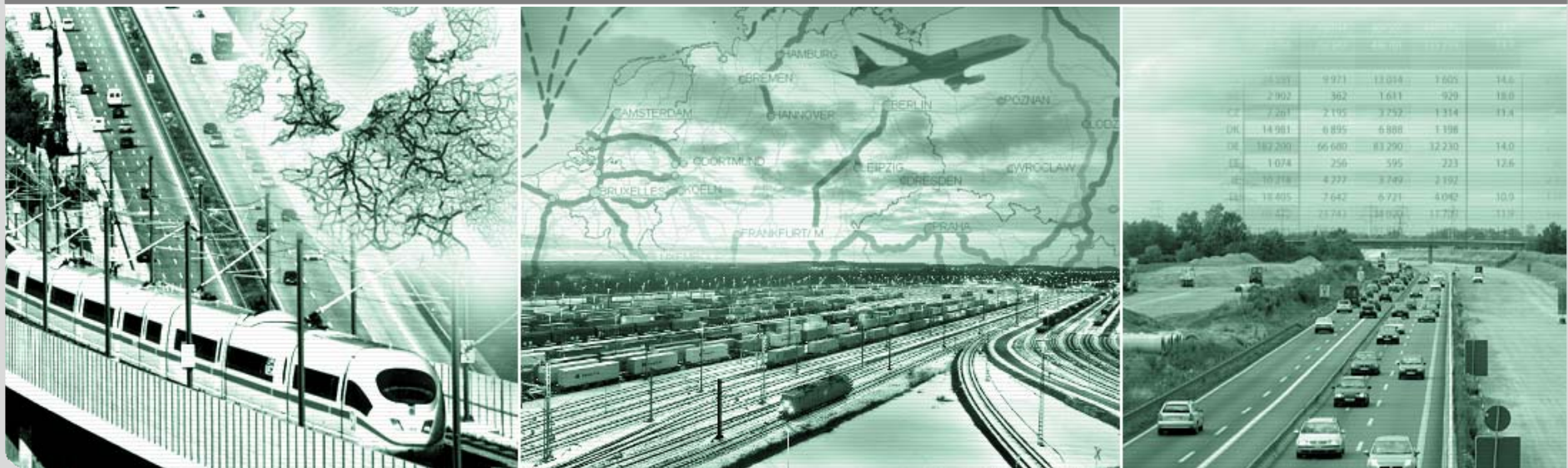
- **Future-oriented, market-based infrastructure cost model**
- **Application of different road categories**
- **Infrastructure costs of four-lane federal roads are relatively high**
- **Application for other infrastructures is feasible**

Feedbacks are welcome!

Bange@kit.edu

CORNELIA BANGE

INSTITUTE FOR ECONOMIC POLICY RESEARCH (IWW), NETWORK ECONOMICS



Back up

CORNELIA BANGE

INSTITUTE FOR ECONOMIC POLICY RESEARCH (IWW), NETWORK ECONOMICS



ProgTrans/IWW model description IV

Construction categories		Allocation principles							
		Proportionally	Specific costs cars	Specific costs HGV<12t	Specific costs HGV>12t	Capacity-dependent	Weight-dependent AASHO		
Land acquisition						100			
Earthworks/ drainage	(B)					100			
	(M)					100			
Base layers	(B)		X	Y	Z				
	(M)								
Binders	(B)								
	(M)								
Road surface	(B)					100			
	(M)						100		
Tunnels	(B)	45			5	50			
	(M)	80			20				
Bridges	(B)				15	85			
	(M)				15	85			
Equipment	(B)	33				67			
	(M)	33				67			
Branches, nodes	(B)	20	20	10	10	40			
	(M)	15			10	40	35		
Motorway maintenance depots	(B)	33				67			
	(M)	33				67			
Service areas and lay-bys	(B)	20	15	5	60				
	(M)	20	15	5	60				
Administration/police		33			67				
Upkeep		35		15	50				