VIENNA 2018 TRA TRANSPORT RESEARCH ARENA

A digital era for transport

solutions for society, economy and environment

EuroCombis in Germany – "ecocombis" or "climate killers"?

Stefan Eckert, Michael Faltenbacher
thinkstep AG, Germany
Theresa Gutberlet, Alexander Labinsky, Hans-Paul Kienzler
Prognos AG, Germany

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Daimler Sindelfingen

37,000 employees

300,000 vehicles/a

1,700 delivery trucks per day

Why EuroCombis?

- Load density of automotive parts 300 kg/pallet

Truck type	# pallet locations	Load	Payload	Utili-zation
 Semitrailer combination	34	10.2 t	25.0 t	41 %
 Articulated train	38	11.4 t	22.1 t	52 %
 EuroCombi (type 3)	53	15.9 t	17.4 t	91 %

- Rule of thumb: 2 ECs replace 3 CTs
- Potential for significant cost savings

Why this study?

- National field test
  - Focus on operational and road safety
  - Since January 1, 2017, ECs allowed on dedicated road network (“Positivnetz”)
  - Limited assessment of environmental impacts
- Aim: Investigation of climate effects related to EC use

Staged approach

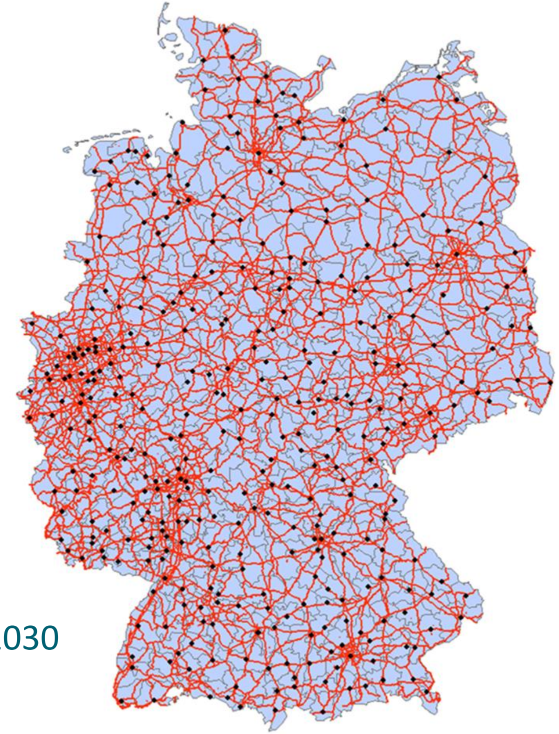
- Intra- and intermodal shift towards ECs
  - Suitability of goods for EC transport
  - EC suitable transport volume
  - Comparison of transport costs
- Impact on GHG emissions
  - Fuel and traction power consumption
  - GHG emission factors

Modal shift: Suitability of goods

- Average pallet weight <330 kg
- Excluded: liquids, goods transported by special superstructures, hazardous goods
- Regular occurrence
- Shares for partly suitable goods classes

Modal shift: EC suitable freight volume

- Single-relation/single-type of good
- Freight volume road and rail
- Starting and end point connected by dedicated road network
- 2nd scenario: non-restricted highway network and transport volume for 2030



2030

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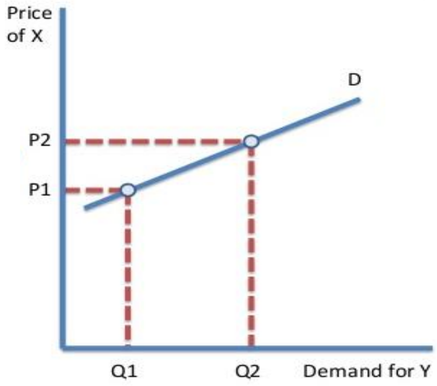
Modal shift: Cost comparison

- Transport distances and volumes
- Specific transport costs
- Transport costs for each good and relation
- Cross-price elasticity approach



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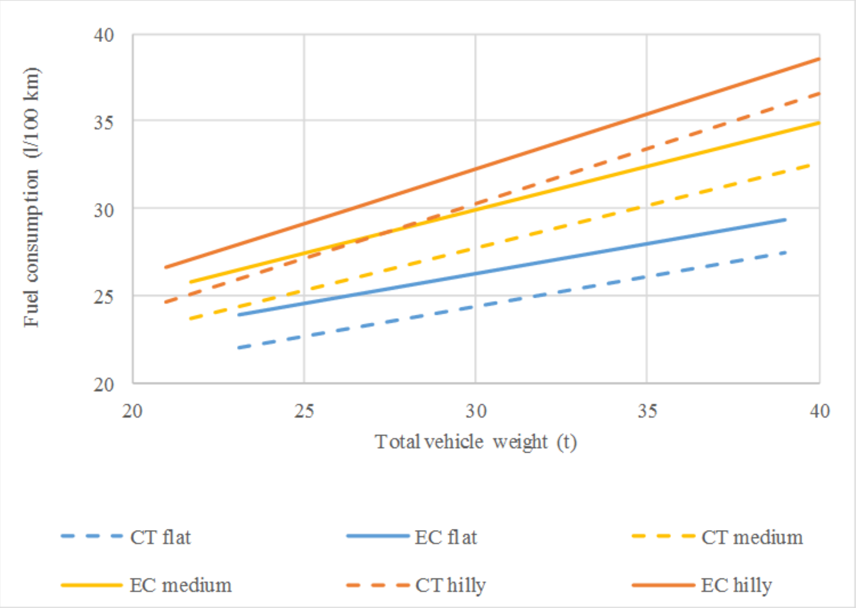
GHG balance: Fuel consumption

- HBEFA FCFs not suitable
  - Considerably too high compared to actual real-world consumption
  - ECs not considered
- Derivation of new FCFs
  - Current operational data
  - Consumption simulations



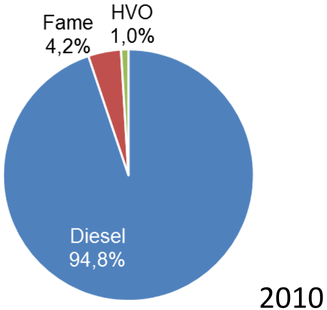
GHG balance: Traction power consumption

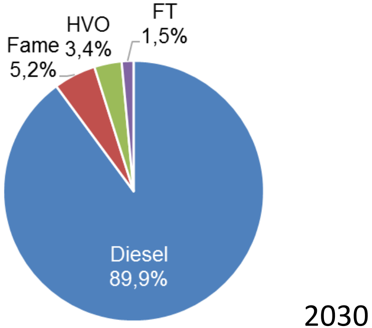
- Modeling of standard trains
  - 23 wagons
  - 5 wagons laden with EC suitable goods, others with average load

- Electricity consumption per ton payload and km as a function of total train weight

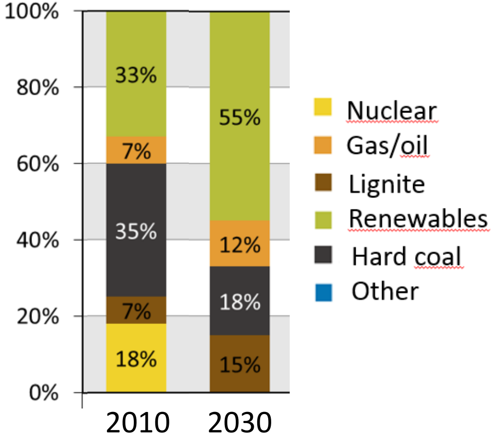
GHG balance: GHG emission factors

- Biodiesel share and composition





- Energy mix for electricity generation



Results: Modal shift

	Scenario	EC suitable freight volume (m. t)	Shifted to ECs (m. t)
Intramodal (CT -> EC)	2010	100.00	8.91 (9 %)
	2030	415.00	41.60 (10 %)
Intermodal (rail -> EC)	2010	4.93	0.05 (1 %)
	2030	16.60	0.07 (<1 %)

- Opening of highway network increases EC suitable potential and shift
- Intermodal shift comparably low

Results: GHG balance

	Change in GHG emissions (t CO_2e/a) 2010	2030
Intramodal shift	-21,656	-113,428
Intermodal shift	+337	+419
Ratio inter-/intramodal shift	1.6 %	0.4 %
Total inter- and intramodal	-21,319	-113,009

- GHG balance in both scenarios clearly dominated by intramodal shift and related GHG reduction

Conclusions

- Individual trips
  - Intramodal shift: GHG emission savings of up to 20 % possible
  - Intermodal shift: GHG emissions more than threefold
- Overall
  - Use of ECs limited to small fraction of freight transport (<1 %)
  - Impact on GHG emissions small (<0.2 %)
- Limitations
  - Other EC types or cross-border transports not considered

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Contact

Stefan Eckert

thinkstep AG
stefan.eckert@thinkstep.com
+49 711 341817-473