Life Cycle Energy Labels for Products

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METASTUDY ENERGY EFFICIENCY IN GERMANY

[PJ]

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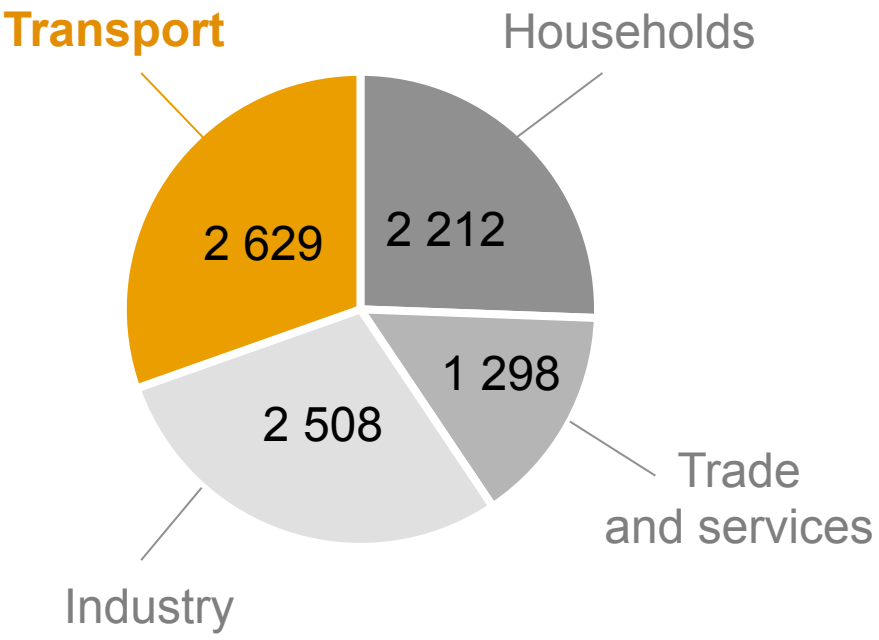
Metastudy Energy Efficiency in Germany

- New 2nd edition (Sauer et al. 2016)
  - updated and extended
  - release late 2016
- Focus in this presentaion
  - **transport sector** chapter
  - energy statistics & scenarios
  - analysis of the results

Transport sector relevance –> No 1

30 % of final energy consumption in 2014

final energy consumption



[PJ_{2014}]

(AGEB 2015)

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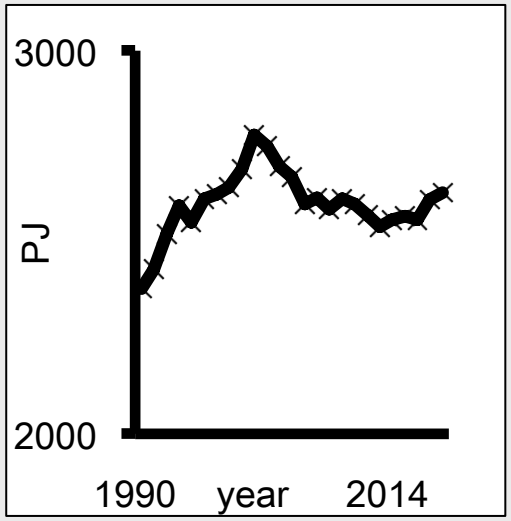
Energy balance of Germany's transport sector

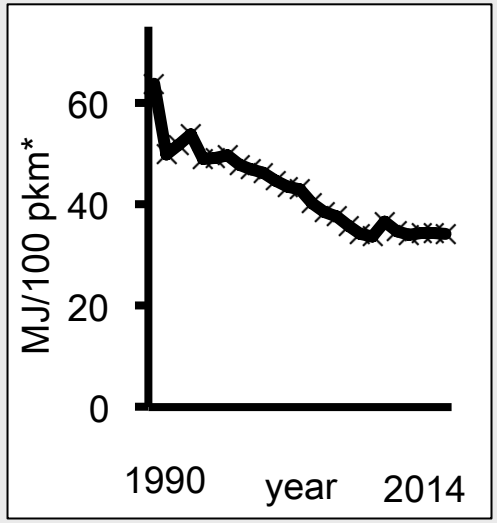
… Looking in the **past** (indicators 1990 – 2014)

final energy consumption



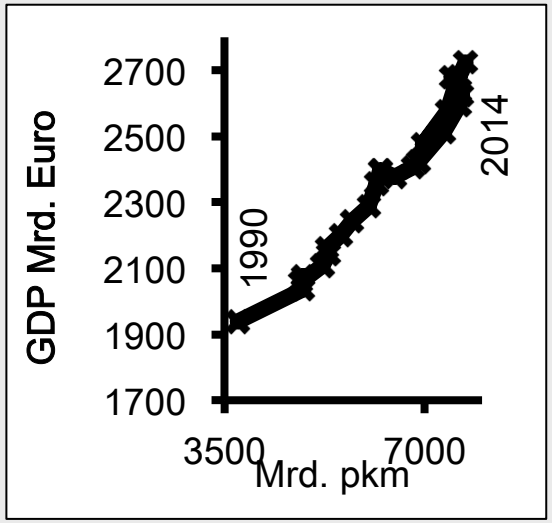
growth up to 1990, followed by a decline decade, now growth seems back

energy efficiency



improved strongly up to 2008, then improvement stalled

economic & traffic growth



Economic growth = traffic growth
1 € $GDP_{1990-2014}$ = 2,6 pkm (Schoer et al. 2007)

Analysis and open questions

- International transport is not included in indicators: + >100 % final energy tkm
- Including transport energy consumption in supply chains in energy labels?

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Units of transportation measurement
pkm= passenger-kilometre
tkm = tonne-kilometre
* Conversion: 1 tkm = 10 pkm (AGEB 2015)

References for the data of the above indicator are listed in the EEP meta study (Sauer et al. 2016)

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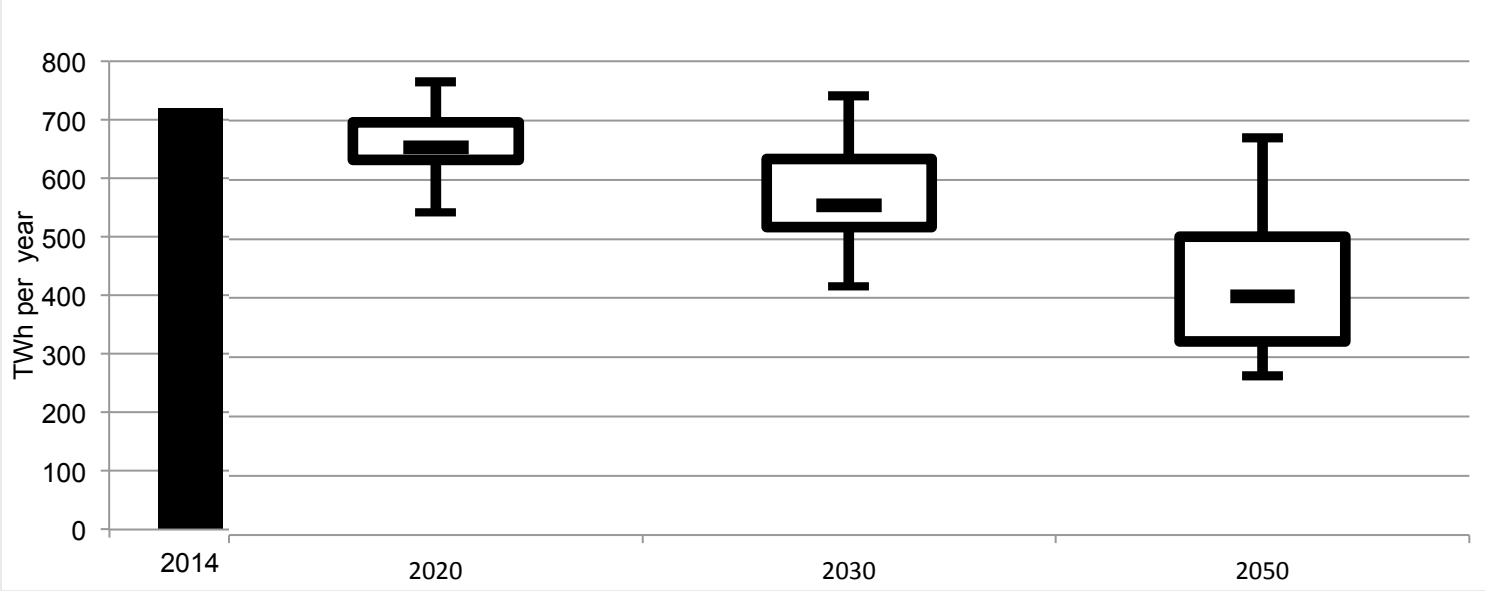
Energy scenarios in Germany's transport sector

… Looking in the **future** (2014 – 2050)

final energy scenarios (n = 51)



Alternative fuel vehicle strategy seems to lower the final energy consumption in the future

Analysis an open questions

- Weakness of scenarios: Only use phase based
- Integration of the manufacturing energy consumption in energy labels?

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References for the data of the above indicator are listed in the EEP meta study (Sauer et al. 2016)

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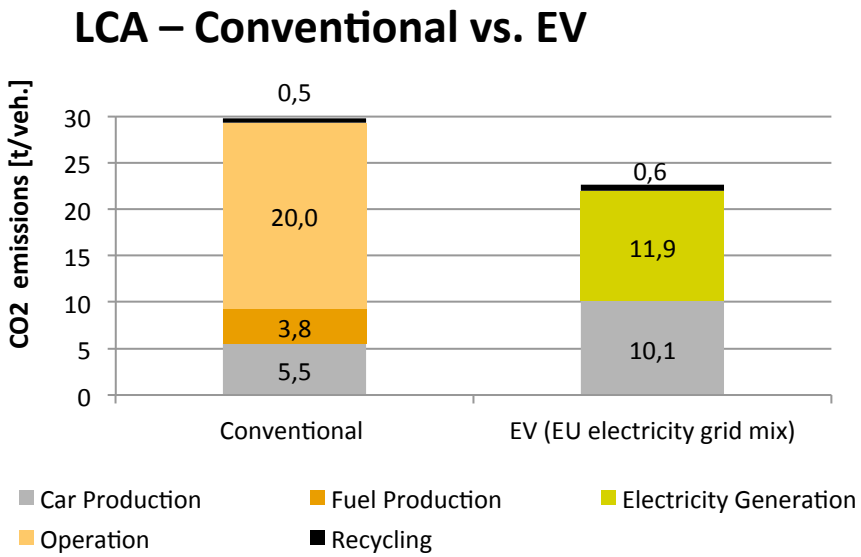
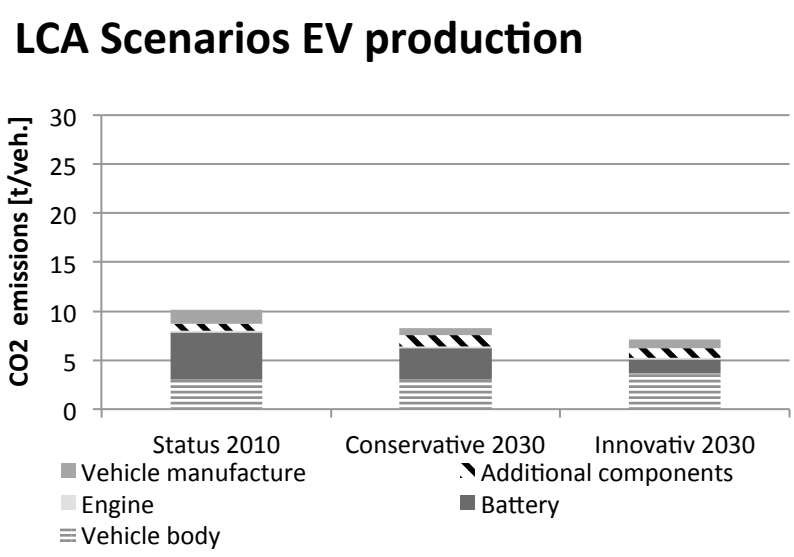
References
Growing importance of the manufacturing energy consumption

- manufacturing with weight saving material is more energy demanding (Cameron et al. 2009) (Rommel et al. 2012)
- producing an electric vehicle (EV) can be 84 % more CO_2 intense than a conventional vehicle (Daimler AG 2016)



based on (Daimler AG 2016)



(Helms et al. 2011)
– normalized to 10,1 t CO_2

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LIFE CYCLE ENERGY LABELS FOR PRODUCTS

A MARKET BASED DRIVER FOR ENERGY EFFICIENCY IN THE TRANSPORTATION AND MANUFACTURING SECTOR?

„Status Work in Progress“

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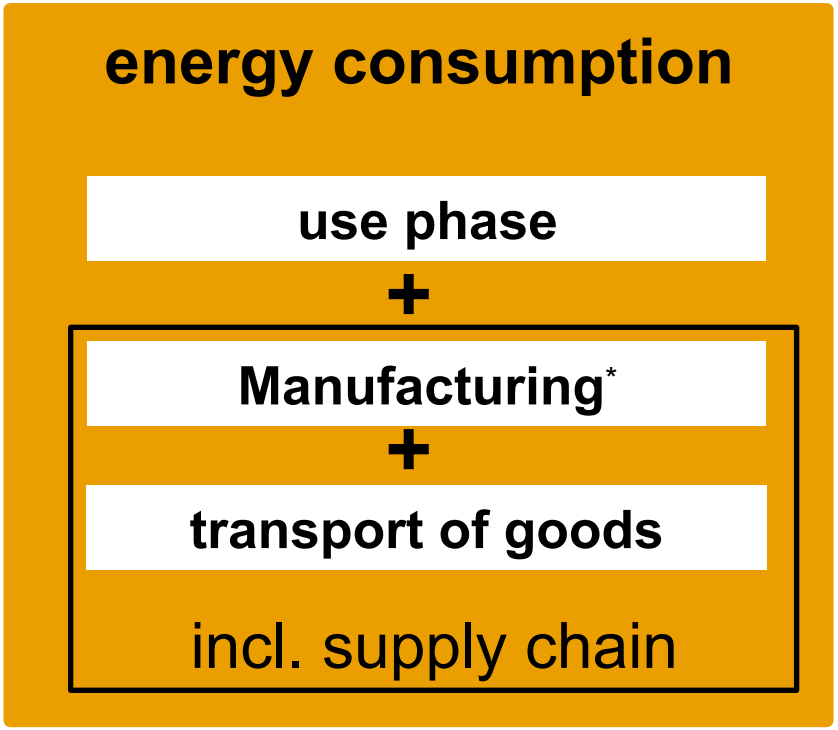
Concept of a new energy efficiency policy instrument

Status quo

- EU Energy Label for products
  - use phase based
    - energy consumption (2010/30/EU)
    - car CO_2 emissions (1999/94/EC)
  - → nudging customers (Haq 2016)
  - → competition among manufacturers (BMWi 2015)
- Product Carbon Footprint methods
  - mainly used in product development
  - not mature enough for a mandatory policy scheme

(Chomkhamsri 2011); (EC 2011)

Life Cycle Energy Labels



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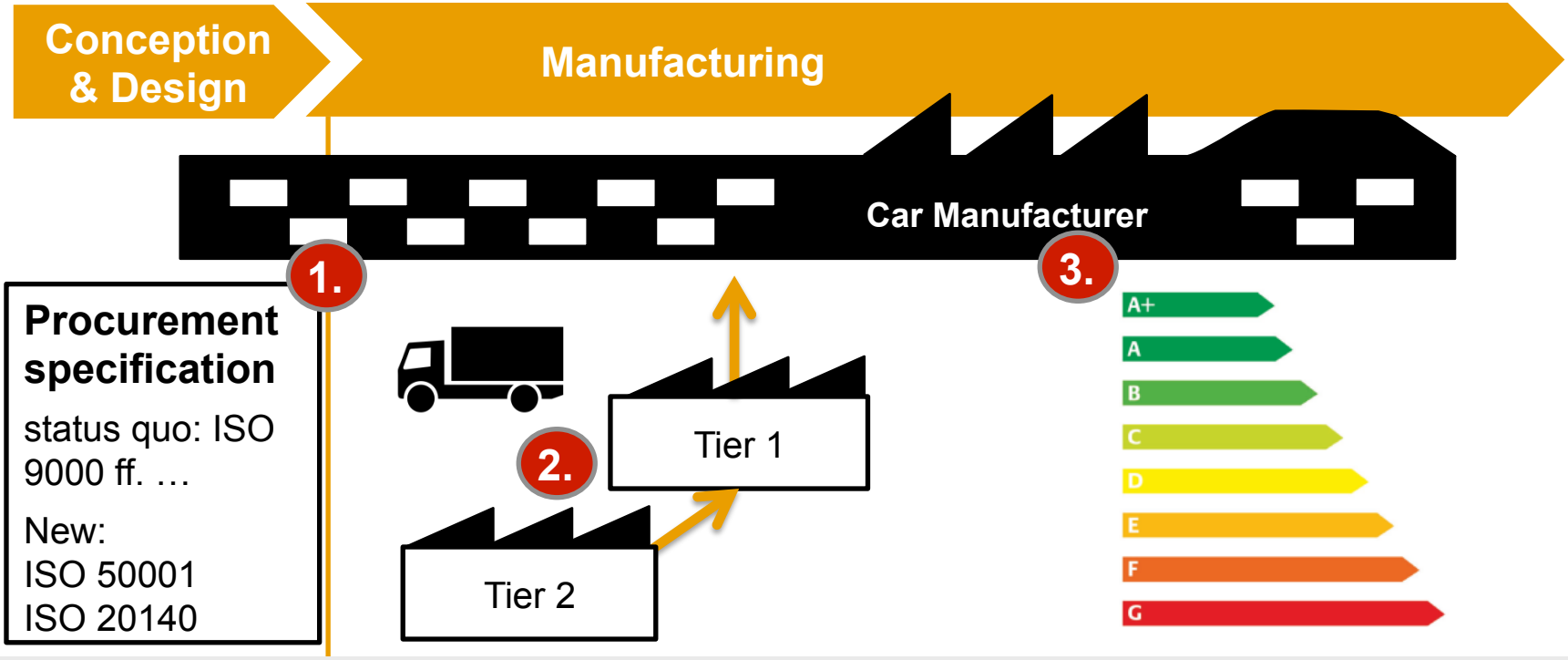
* in the further development of the concept the recycling could also be included

Realizable in highly automated manufacturing branches? Hypothetical Example for car manufacturing



1. The car manufacturer demands in his procurement specifications energy data (and energy efficiency improvement) for the manufacturing (incl. transport) of parts and subassemblies from it's "Tier 1" suppliers
2. The "Tier 1" supplier compiles the data based on the data from his own Energy Management System …
   … and the data from the Energy Management System of his own "Tier X" suppliers …
   … and the data from logistic companies in the supply chain (transport)
3. The car manufacturer calculates the energy consumption for the manufacturing (incl. transport) of a car and provides the information to the customers

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Feasibility Check

Strengths

- induces market driven…
  - competition on most energy efficient manufacturing and transport of products
  - upscaling of the deployment of energy management systems
- the instrument is not bound to national boundaries - the whole supply chain incl. energy consumption abroad can be addressed

Weaknesses

- comparibility of energy consumption in manufacturing processes is challenging
  - Automated
  - manual
- product specific energy usage can be seen as a business secret as it is one part of the products cost structure

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Future outlook

Figure Reference (Bauernhansl et al. 2016)

Digitalisation of the manufacturing industry

↓

Growing data availability
(Bauernhansl et al. 2016)

This could also enable new energy efficiency policy instruments based on data from cyberphysical systems

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Discussion topics

1. **Feasibility of Life Cycle Energy Labels**
   What effects do you think are relevant which have not been mentioned in this presentation?

2. **Thesis**
   Circular economy models should also consider to minimize transport energy consumption
   → Are Life Cycle Energy Labels therefore a appropriate approach?

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