

Innovative Technologies to reduce Resource Use and Greenhouse Gas Emissions

the case of Lightweight Boards

S. Feifel, W.R. Pogonietz, L. Schebek

Department of Technology-Induced Material Flows
Institute for Technology Assessment and System Analysis
Forschungszentrum Karlsruhe, Germany

Zürich, June 19th, 2009

Chipboards vs. Lightweight boards

Chipboards consist of

- more or less homogenous panels made of chipped wooden material
- made of fresh wood as well as recycled material



Source: www.glanz.de

Lightweight boards consist of

- thin cover layers (i.e. chipboards)
- core layers made of paper (expanded hexagon honey combs or corrugated card board) and
- frames



Source: www.egger.com

Lightweight boards

- Advantages
 - reduced demand for solid wood by replacing the core by wetted paper, which bases on recycled paper
 - reduced demand for energy
 - both should reduce GHG emissions as well as resource use
- Disadvantages
 - crowding out of traditional demander of recycled paper (i.e. paper and print industry)
 - increased demand for solid wood to substitute recycled paper by the paper industry

Chipboards vs. Lightweight boards – Resource Use

Example: 25 mm thickness

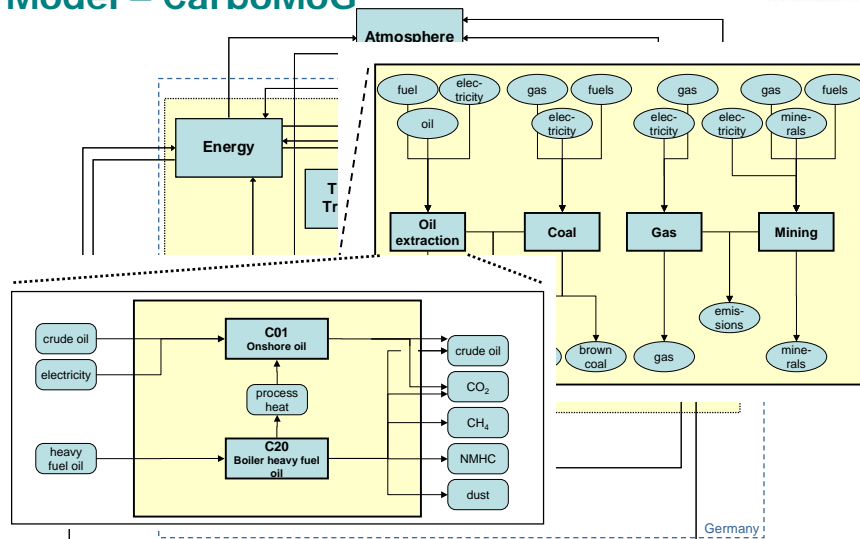
Selected items	Chipboard	Lightweight board	Change
Solid wood	0.343 m ³ /m ³	0.110 m ³ /m ³	-68.0%
Waste paper	0 kg/m ³	54.8 kg/m ³	n.a.
Energy	1,530 MJ/m ³	666 MJ/m ³	-56.5%
Board	1.00 kg	0.43 kg	-57.0%

Model – CarboMoG

CarboMoG ~ Carbon Flow Model of Germany

- is a material flow model,
- focussing on the German carbon system,
- contains 215 single material and energy flows and 175 processes
- base year 2000

Model – CarboMoG



Scenarios: quantities of Lightweight boards



Estimation of quantities produced boards in two dimensions (thickness) based on:

- German furniture production statistics
- replaceable amount of board per furniture type/group

Scenario *'Trend slim'*:

➡ 1.97 m m³ chipboard

➡ 20.9 % of produced amount in Germany
15.2 % thickness 16 mm; 5.7 % thickness 38 mm

Scenario *'Trend gross'*:

➡ 2.36 m m³ chipboard

➡ 25.1 % of produced amount in Germany
12.2 % thickness 16 mm; 12.8 % thickness 38 mm

Results: Comparing the two scenarios



	<i>'Trend slim'</i>	<i>'Trend gross'</i>
Production of chipboard	- 21 %	- 25 %
Electric energy	- 1 PJ	- 1.3 PJ
Round wood demand	- 22 %	- 27 %
Industrial wood demand	- 10 %	- 12 %
Transports	- 1.5 m tkm	- 1.6 m tkm
CO ₂ -Emissions	- 614 900 t	- 750 000 t

Conclusions

- Lightweight board could reduce
 - the demand for resources
 - the emissions of greenhouse gases in Germany
- A crowding out of demand of waste paper will happen, but – in our case – not in Germany

