

Carbon Footprint of German Eco-Communities

KH Simon, Kassel

Background – a Study on:

Communitarian Lifestyles – Behavioral and Structural Aspects of Sustainability Benefits

Regional Potentials for Change

as part of of a research program on
Sustainable Economics

● The Study

The aim of the study was to show if in reality existing modes of living are fulfilling the criteria of being sustainable. As a basis for operationalization of the sustainability limit an amount of 1.8 tons of greenhouse gas emissions per capita and year is used. The emissions resulting from the food, mobility and housing sector of an eco-village and two communes in Germany are calculated.

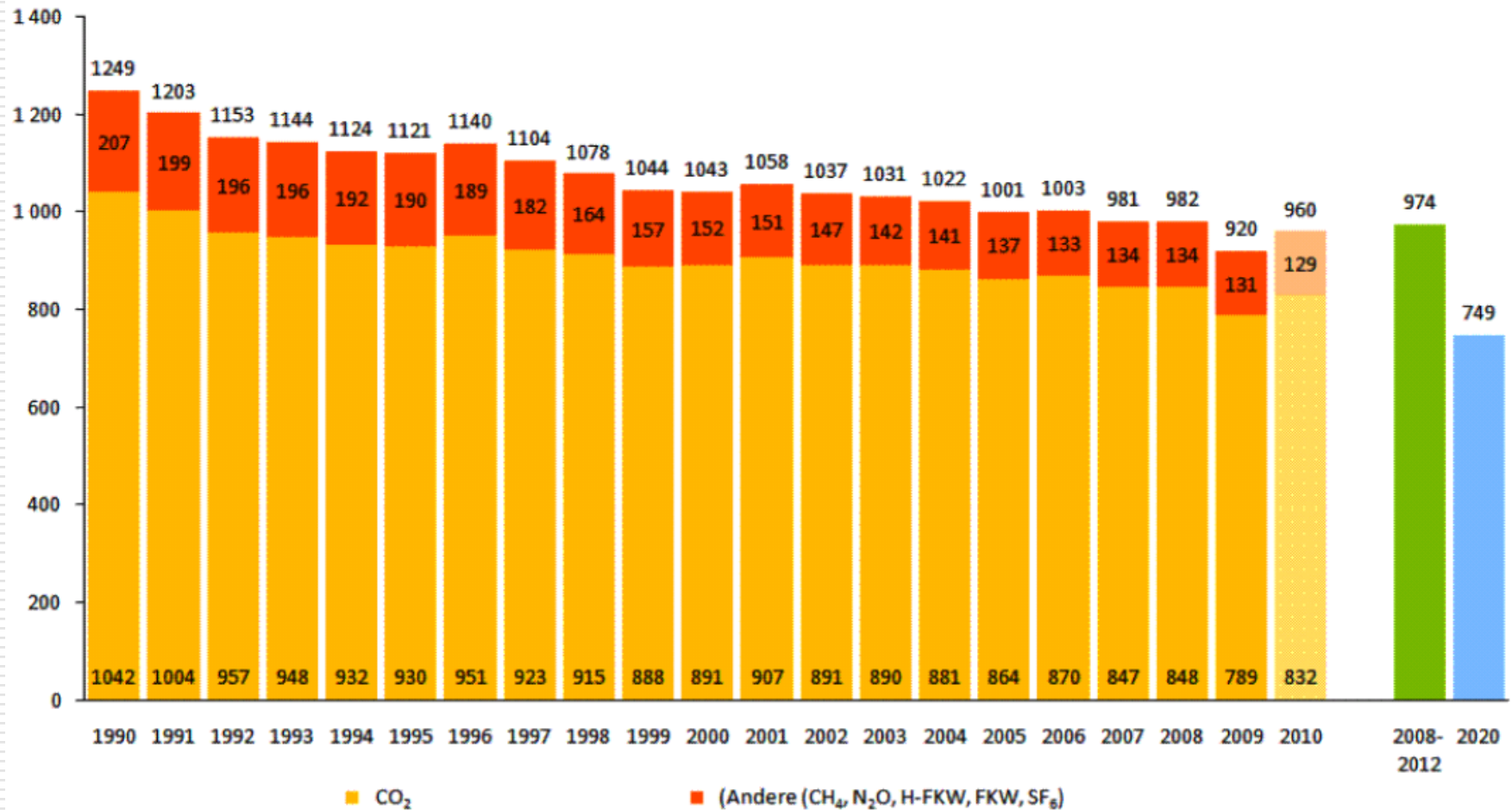
In contrast to these alternatives, data about three reference cases (i.e. small families in Kaufungen) are included in the analysis in order to show whether their environmental impacts are significantly different.

□ „sustainability limit“ 1.8 tons per capita and year

-> environmental space (calculated e.g. by Alcamo at al around 11 billion tons per year

Emissionen der sechs im Kyoto-Protokoll genannten Treibhausgase in Deutschland (ohne CO₂ aus LULUCF)

Mio. t CO₂-äquivalent

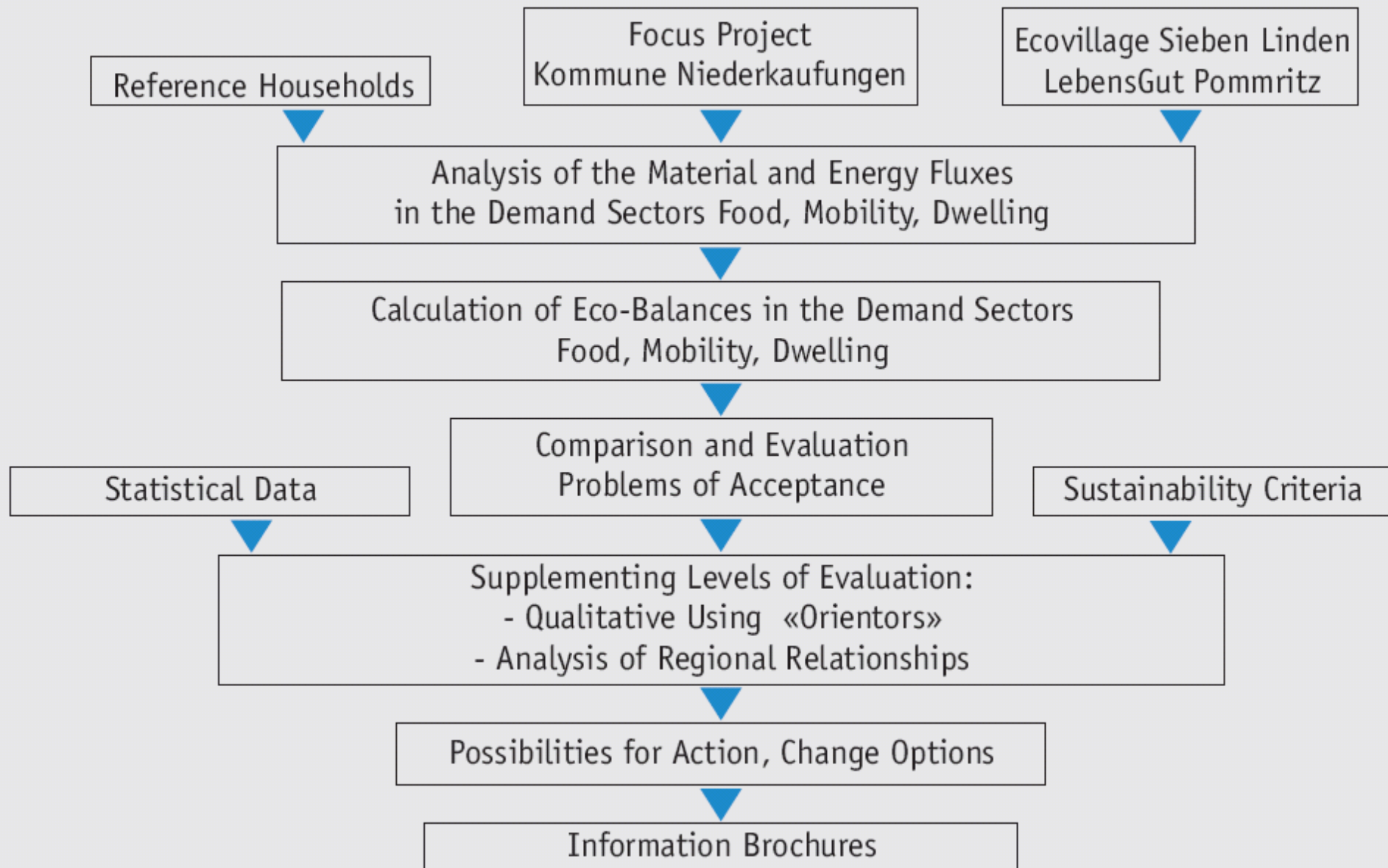


Quelle: Umweltbundesamt, Nationale Trendtabellen für die deutsche Emissionsberichterstattung atmosphärischer Emissionen 1990 - 2009 (Stand 15. April 2011) und Presseinformation Nr. 20/2011 vom 12. April 2011 (Nahzeitprognose für 2010)



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● Steps of Analysis



● The Methods

Method 1: The study integrates life-style analyses and a calculation of related greenhouse gas emissions (i.e. by eco-balances, process chains analyses, life cycle assessment).

Method 2: In order to give support to discussions about the adequateness of chosen measures with respect to sustainability, the so-called “Orientors Approach” is used which allows a multi-dimensional evaluation on the basis of a set of “basic orientors” (like efficiency, adaptability, security, ...).

Carbon Footprint

- Quantitative Criteria: Total Greenhouse Gas Emissions from Housing, Mobility and Food (rough estimate: 80 % of the total emissions relevant for climatic change)
- calculation via GEMIS and standard data on electricity, heating systems, mobility data sets, and formerly developed information on food production



Quality of Data

- and rather precise data acquisition on mobility, food consumption in the participating communities (several data collection campaigns during the project period – consideration of seasonal differences)
- however, these data reflect a certain stage of development and proceeding only – not statistically „objective“ material at all

Examples GEMIS Process Chains

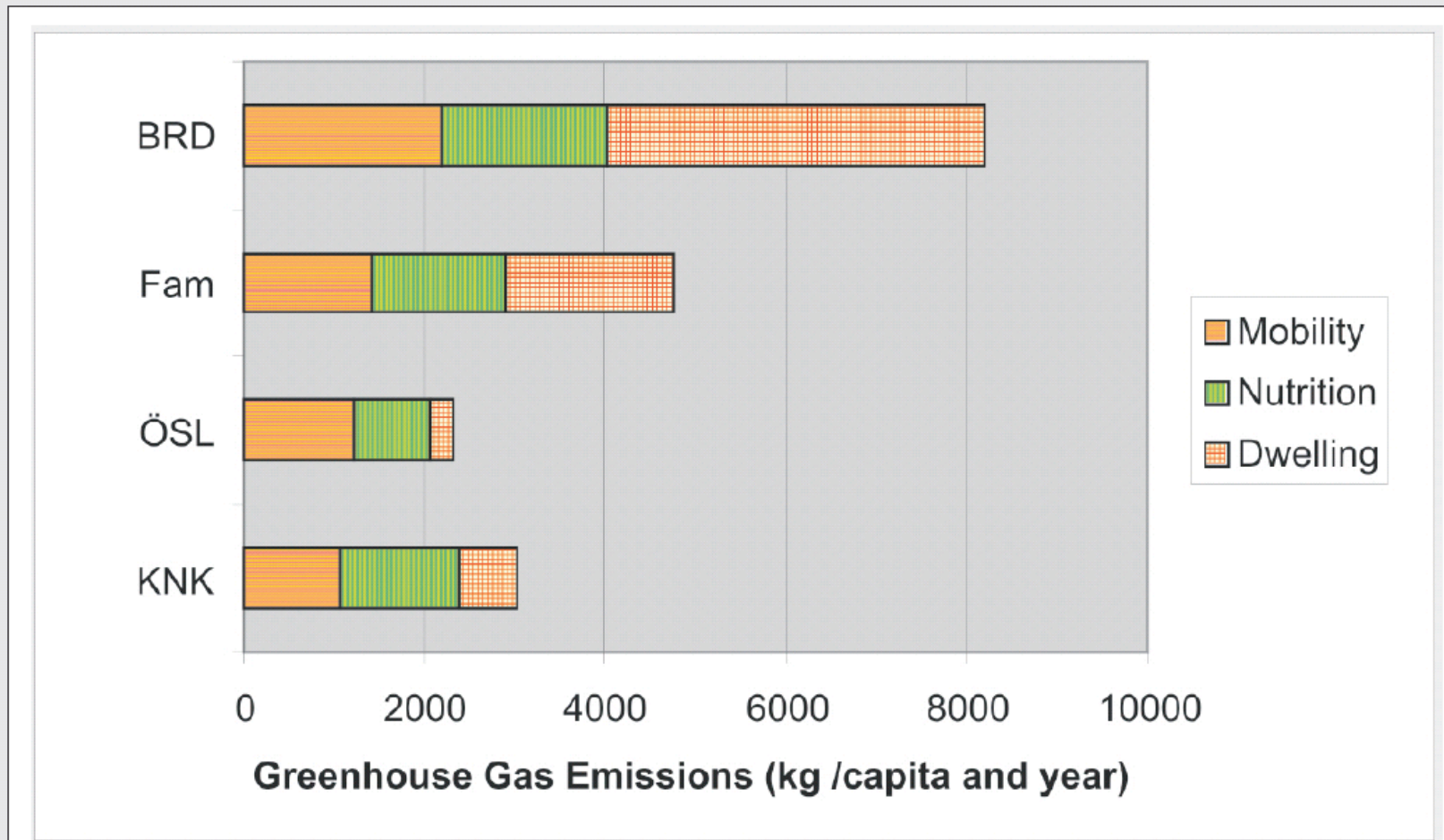


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Character of a Case Study

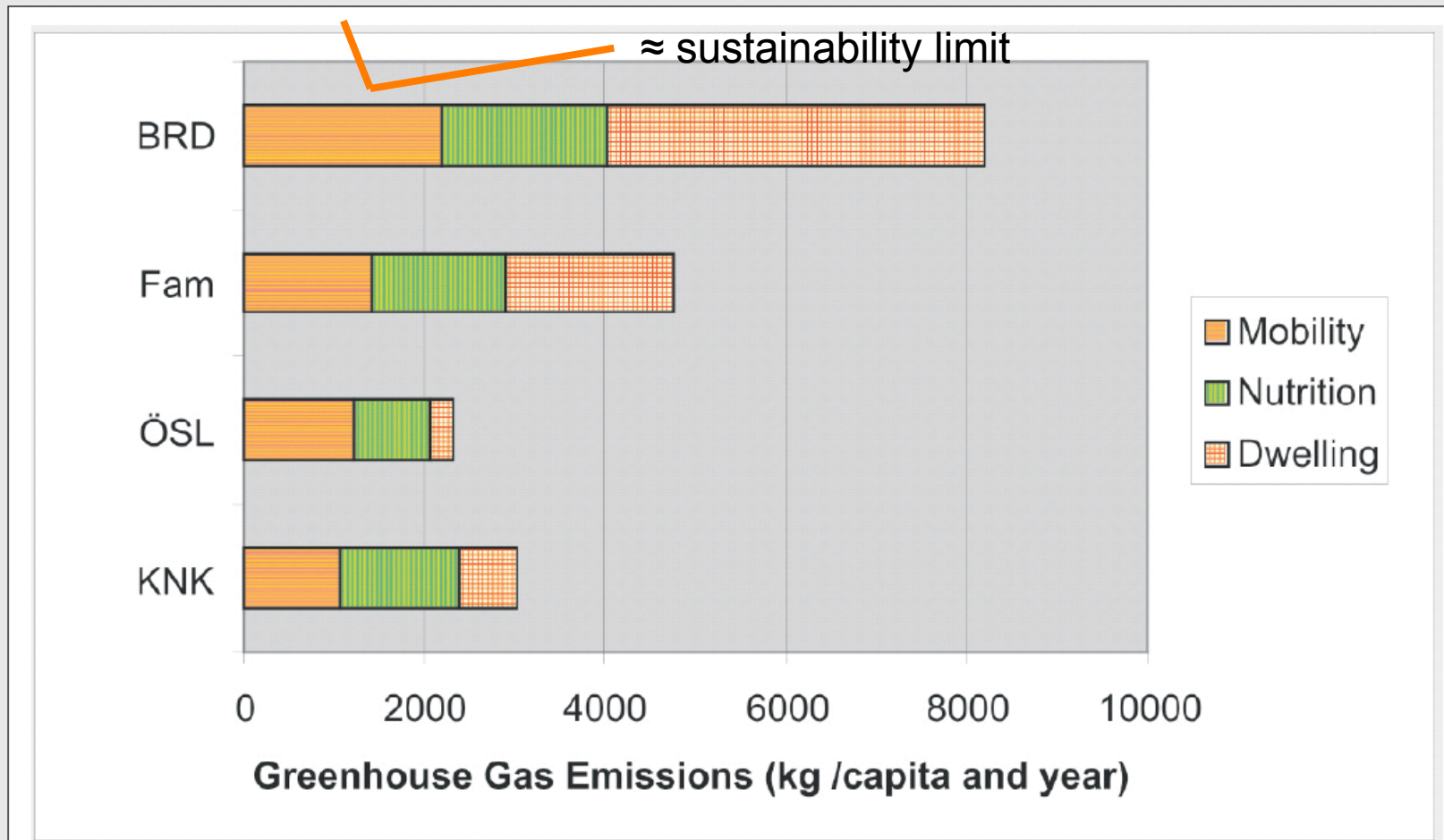
- Therefore, what are the aims of the study?
- → description of the effects of different modes of living / life-styles
- → diagnosis of the distance to a real sustainable stage of living
- → analysis of measures that support the bridgeover of that distance

● Numerical Results



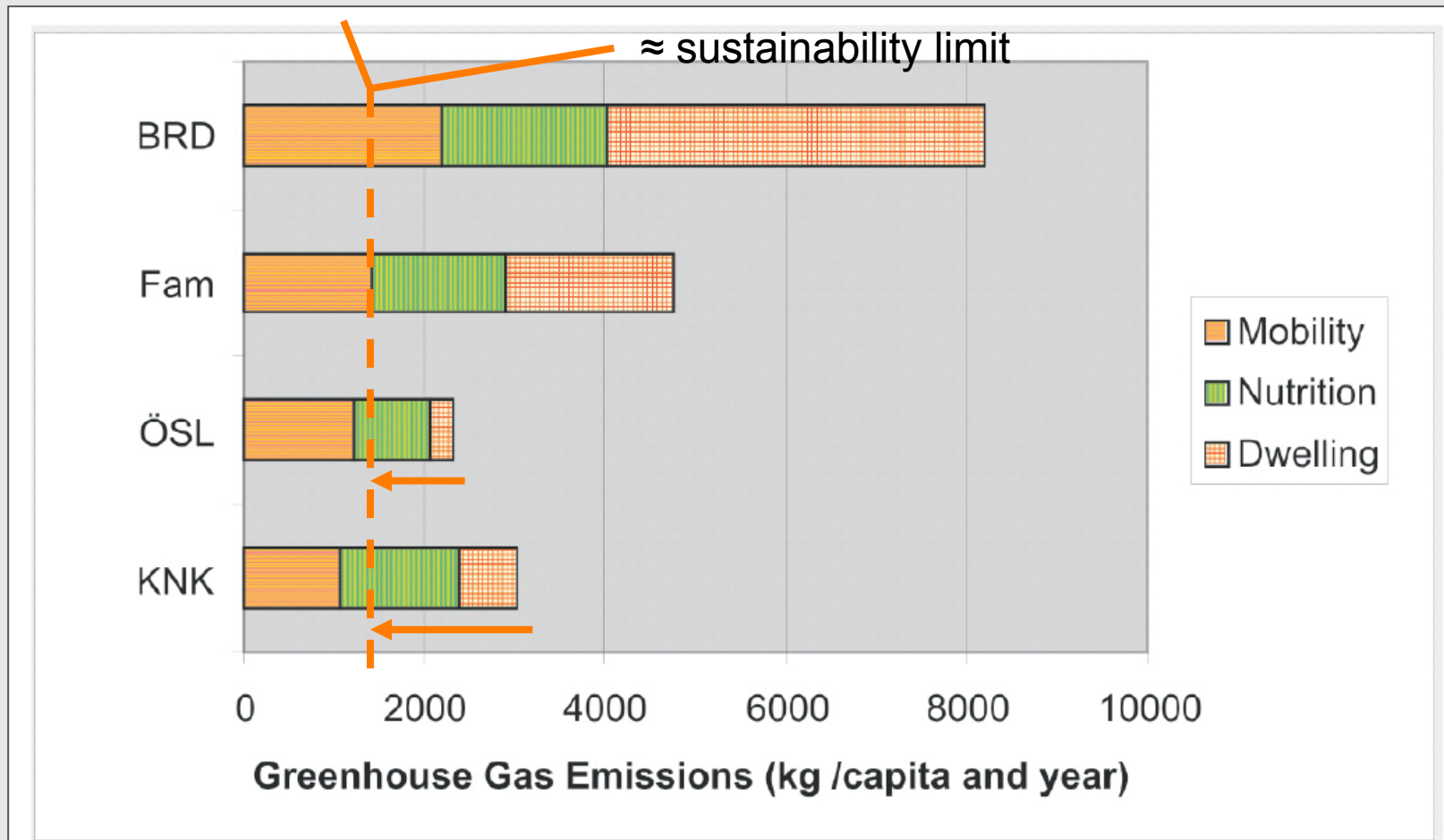
BRD (German average), Fam (small families ecology oriented), ÖSL (eco-village), KNK (commune)

● Numerical Results



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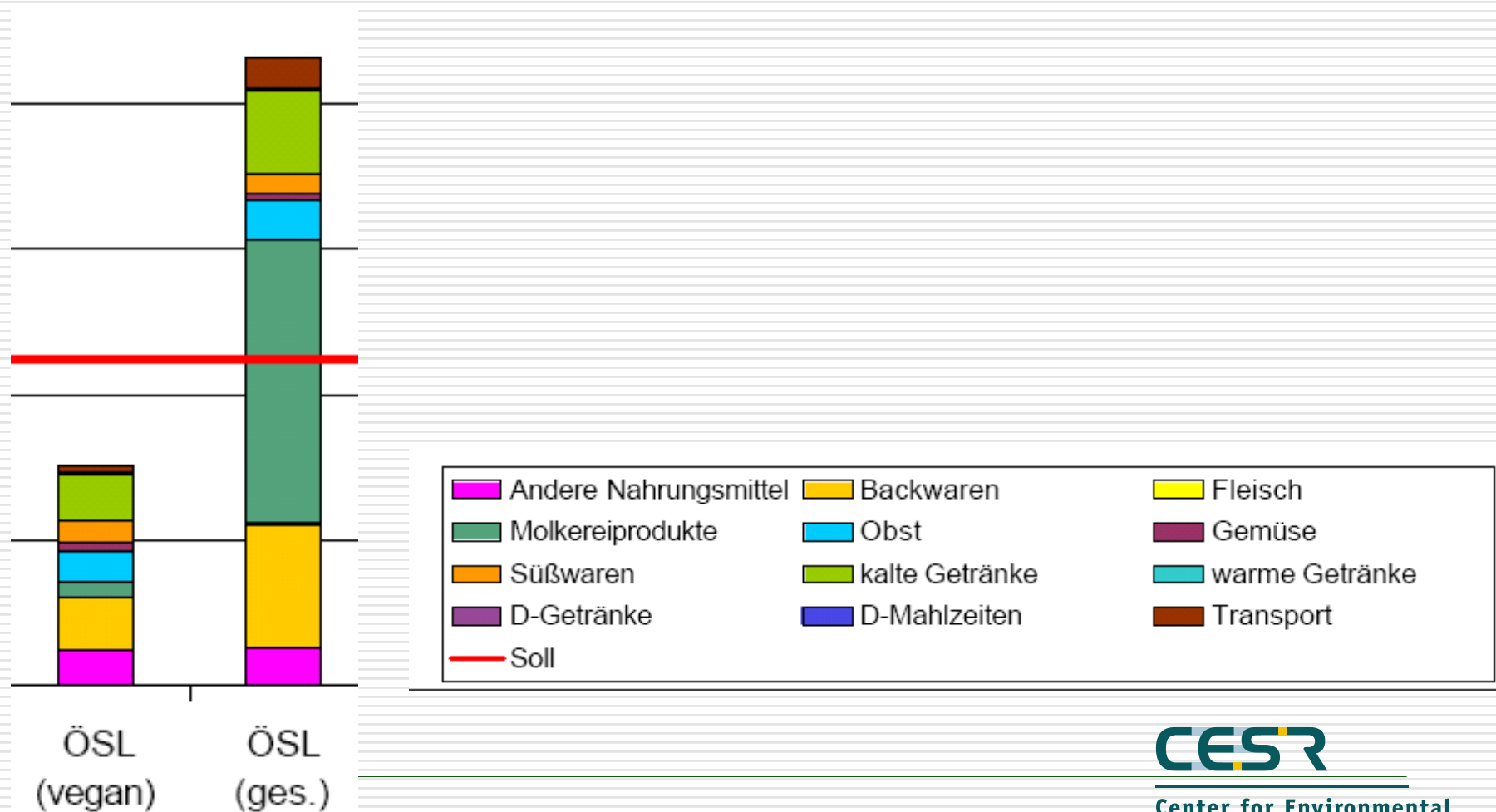
● Numerical Results



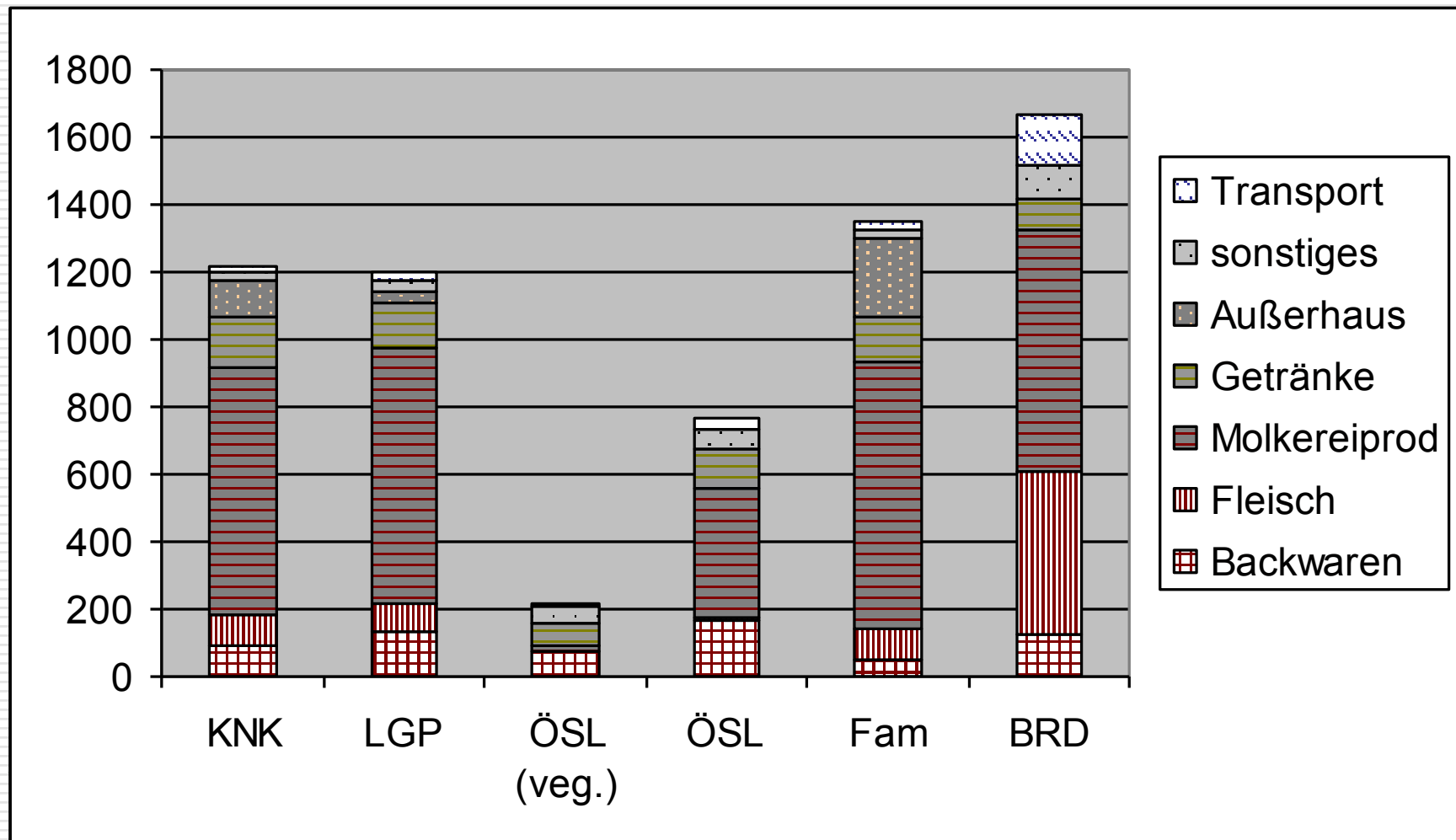
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red line: around 1.6 tons per capita and year

Example „Club 99“



Food Sector - Comparison



● Sustainability-supporting Components

Larger households: small private living space and commonly used areas and facilities

--> energy conservation, energy-efficient heating and water systems

--> reduced individual mobility, car sharing, nearly no flights, vehicles driven by bioenergy

--> vegetarian food preferred



Larger households: wide-spread competences and (human) power available for joint activities

- > growing food and other agricultural activities included
- > minimization of delivery chains and closed cycles
- > conscious decisions about consumed goods



● Radical Sustainability-supporting Components

Larger households: sub-group in eco-village oriented towards sufficiency

--> energy conservation, residential building composed of natural material (bales of straw, wood), recycling materials

--> nearly complete avoidance of electrical devices

--> no animal-based food consumed - dietary vegan

→ greenhouse gas emissions below 1.4 tons per member of „group 99“



Conclusions

- GEMIS is applicable to calculate rather specific consumption modes
- representation as an combination of standard process chains descriptions and specifically implemented additional ones
- no other tools have been tested in the study

conclusions

- empirical basis restricted (case study only)
- however, some general trends about alternative modes of living can be justified

Conclusions

- communities are successful in reducing energy and material flows
- communities show benefits related to sustainability goals
- however, more radical solutions have to be implemented in order to guarantee a really sustainable lifestyle