

Life Cycle Assessment as a Tool for Sustainable Management of Ecosystem Services

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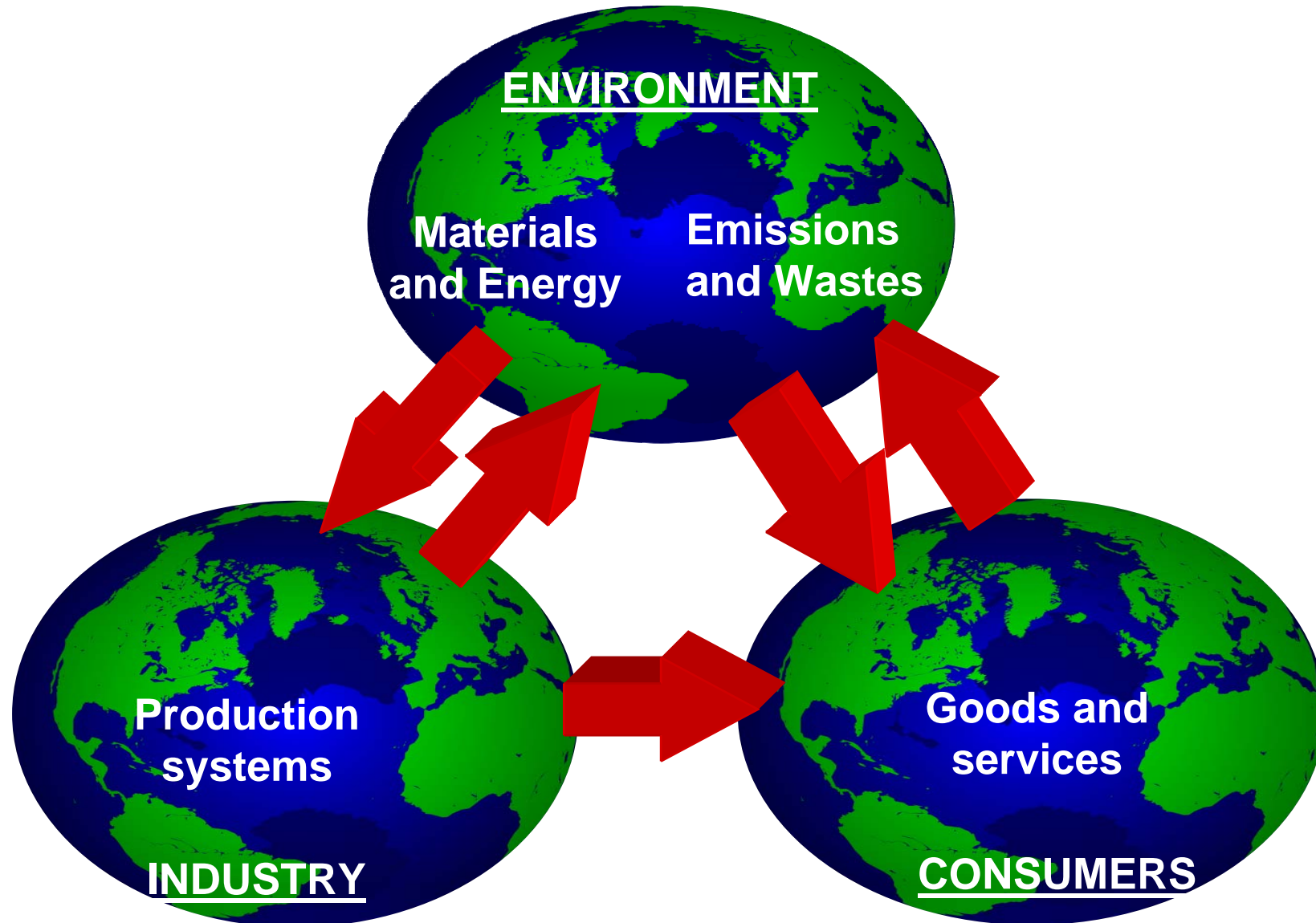
Overview

- ◆ Ecosystem services
- ◆ Life cycle assessment
 - ◆ Energy
 - ◆ Transport
 - ◆ Consumer products
- ◆ Conclusions

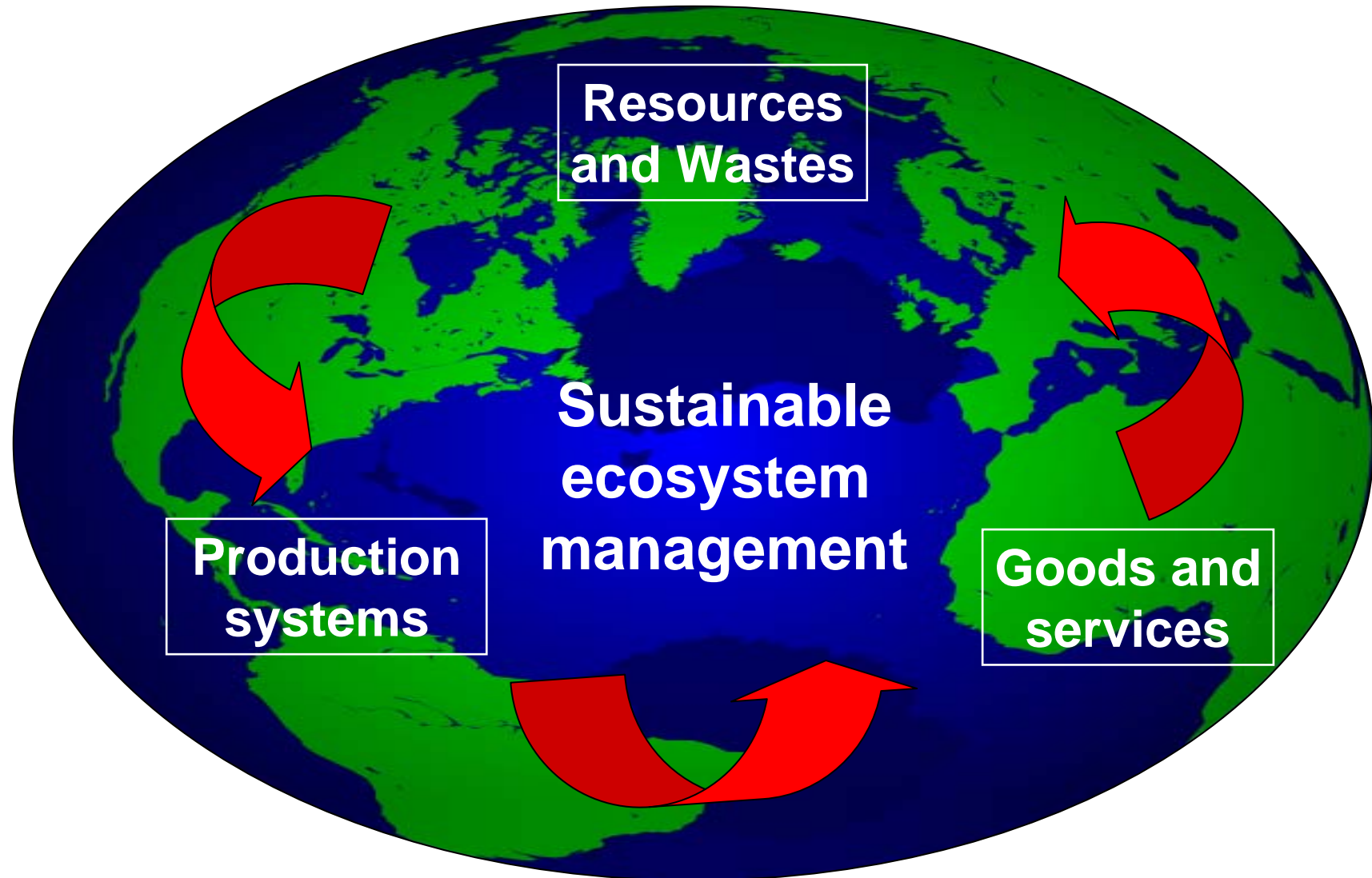
Ecosystem services

- ◆ The processes by which the environment produces resources utilised by humans such as clean air, water, food and materials
- ◆ **Supporting services**
 - ◆ For the production of other services including soil formation, photosynthesis, nutrient and water cycling
- ◆ **Provisioning services**
 - ◆ The products obtained from ecosystems, including food, fuel, bio-chemicals, medicines, and fresh water
- ◆ **Regulating services**
 - ◆ The benefits from the regulation of ecosystem processes, including air quality, climate, water and disease regulation
- ◆ **Cultural services**
 - ◆ The non-material benefits including recreation and aesthetic experiences

Ecosystem services: The current 'three planet' economy



Towards sustainable ecosystem management: The 'one planet' economy

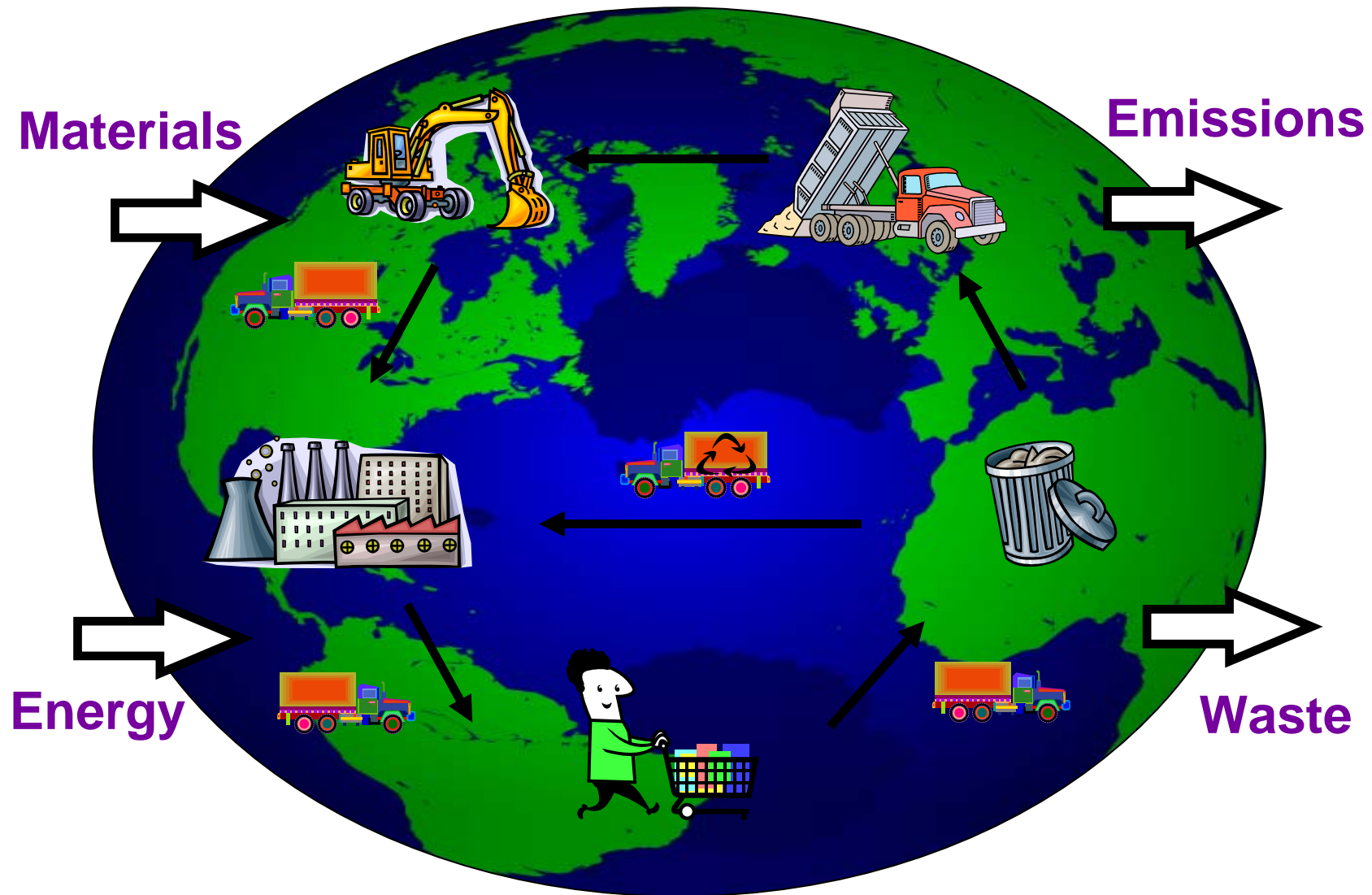


Ecosystem approach

- ◆ Seeks to achieve the sustainable use of ecosystem products and services through:
 - ◆ Management within natural limits
 - ◆ Management for the long term
 - ◆ Management at micro and macro scales
 - ◆ Making trade-offs clear

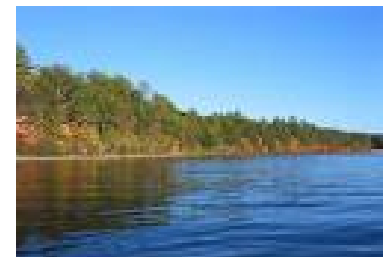


A life cycle approach to managing ecosystem services



Life cycle assessment as an eco-services tool

- ◆ Assesses env'l sustainability of provisioning services
 - ◆ Quantifies emissions and impacts
 - ◆ Identifies hot spots
 - ◆ Identifies opportunities for improvements
 - ◆ Enables comparison of alternatives
- ◆ Identifies impacts on supporting services
- ◆ Informs regulation services
- ◆ Improves cultural services



LCA of provisioning services

◆ Energy



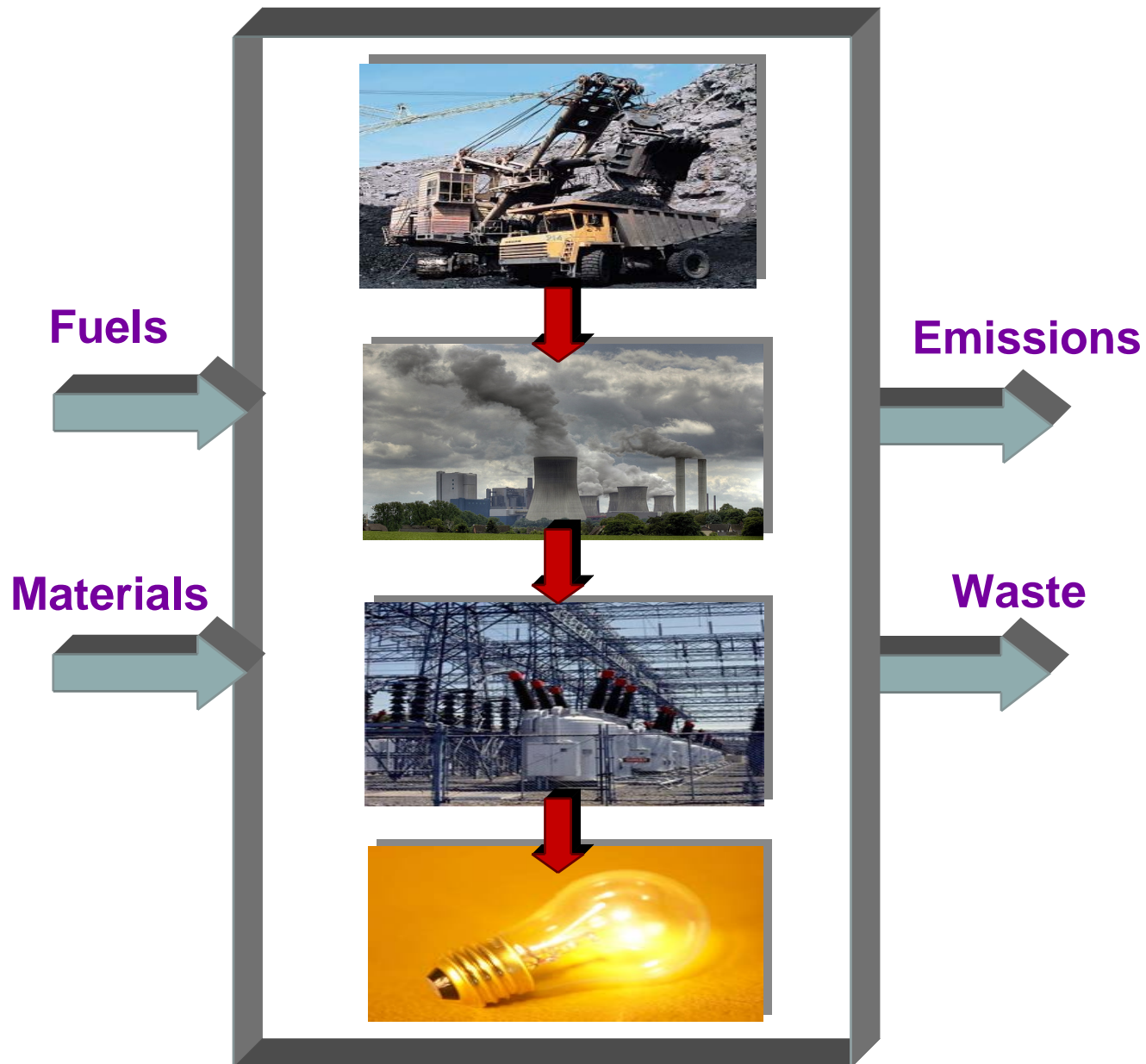
◆ Transport



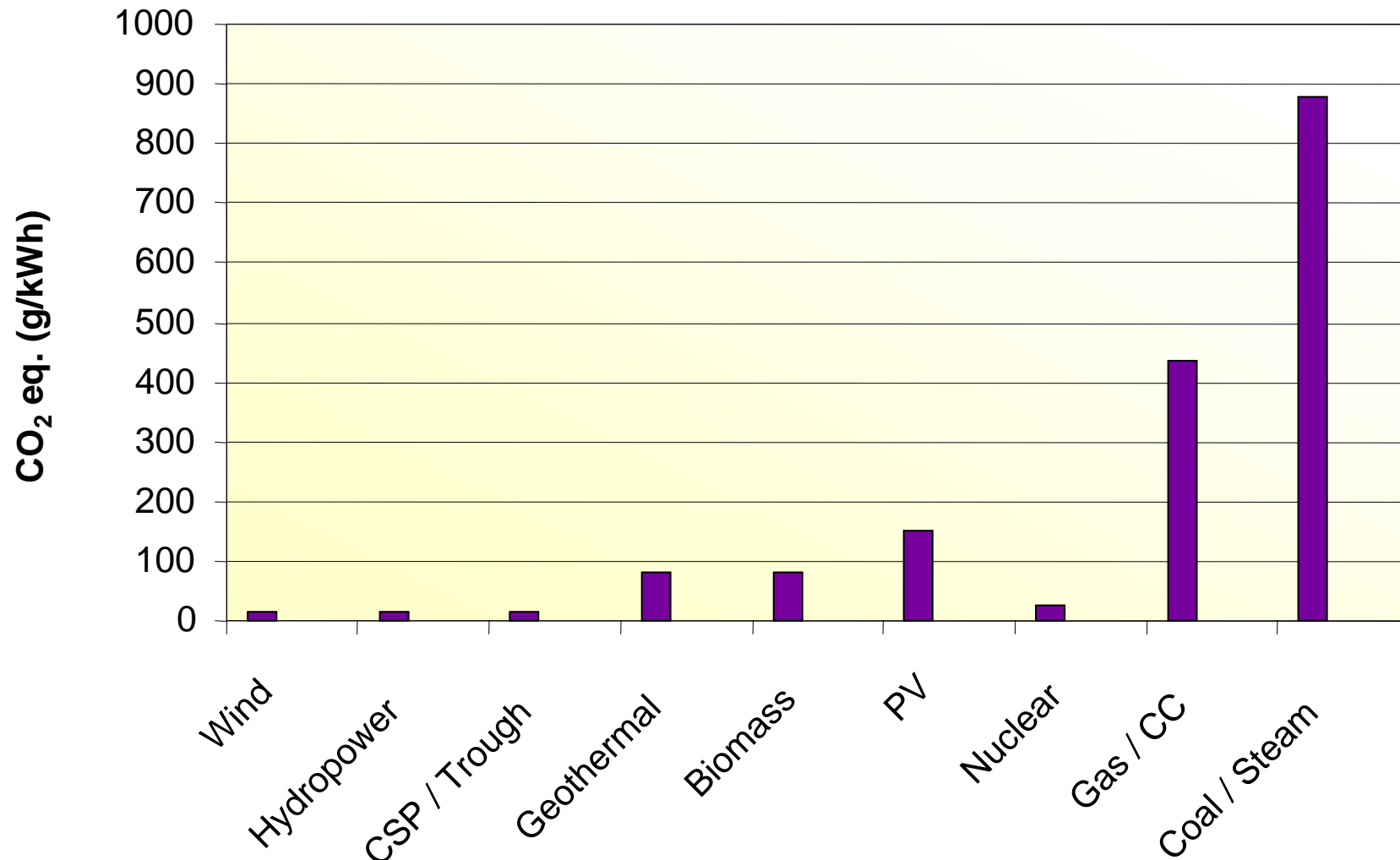
◆ Consumer products



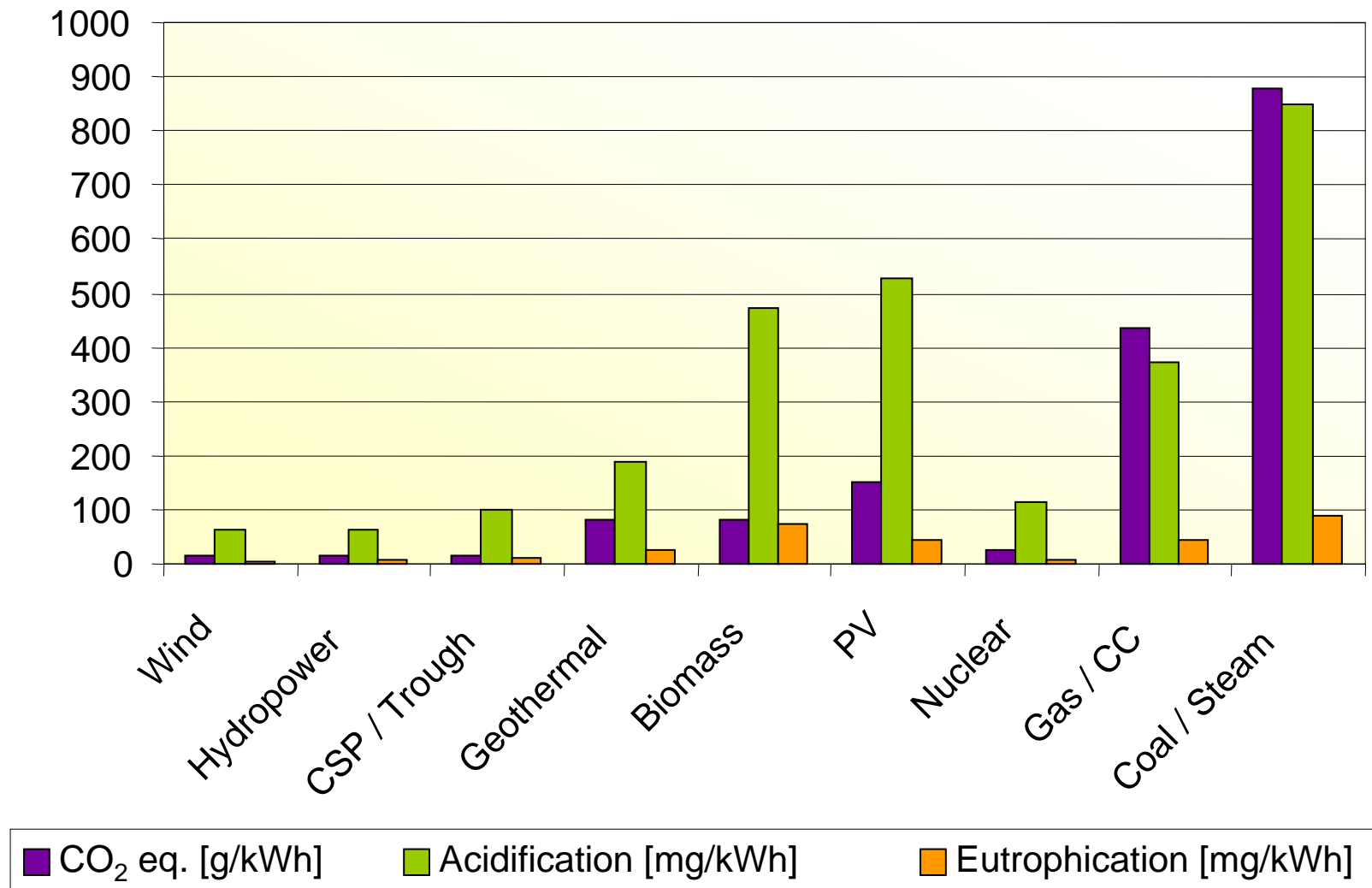
The life cycle of energy



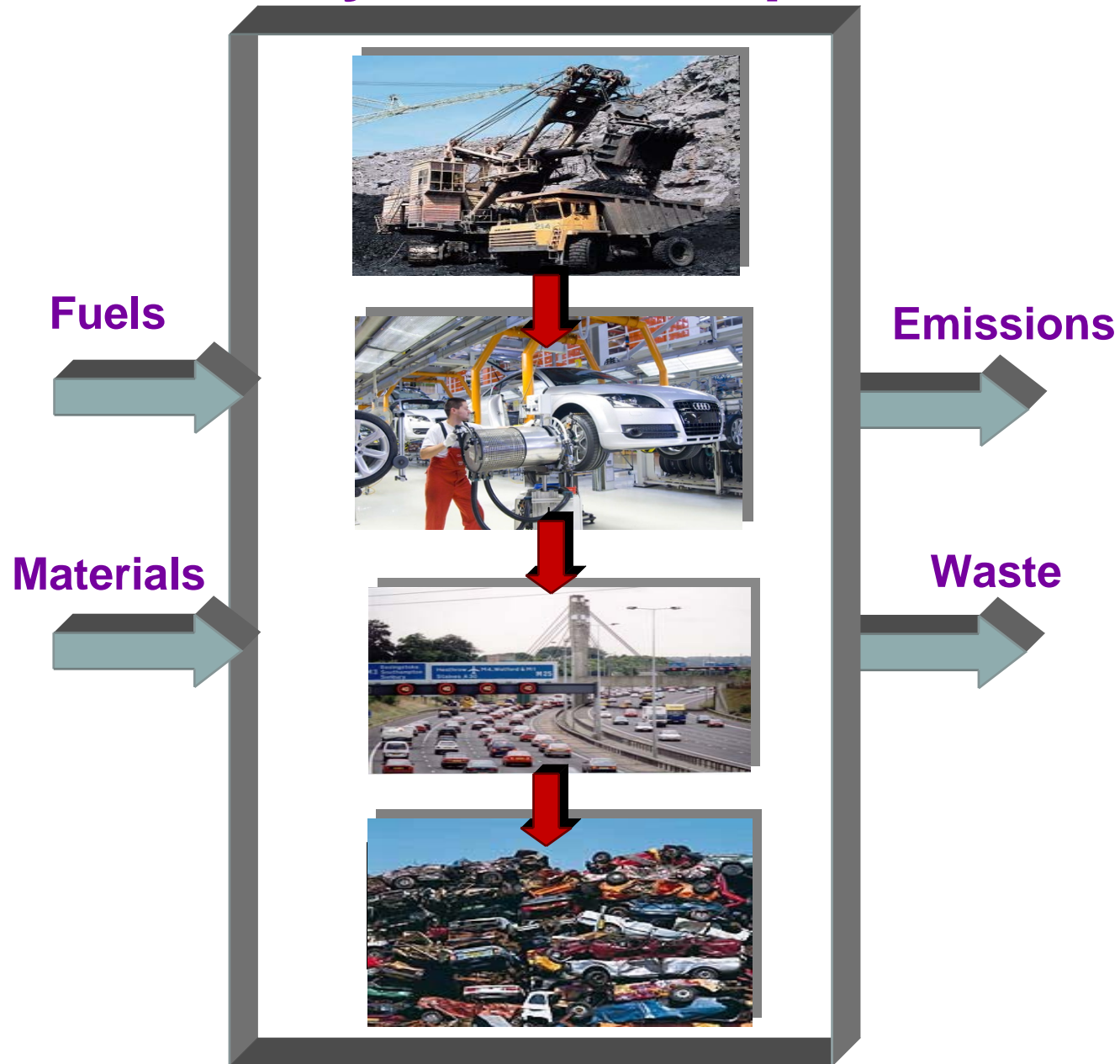
Carbon footprint of energy technologies



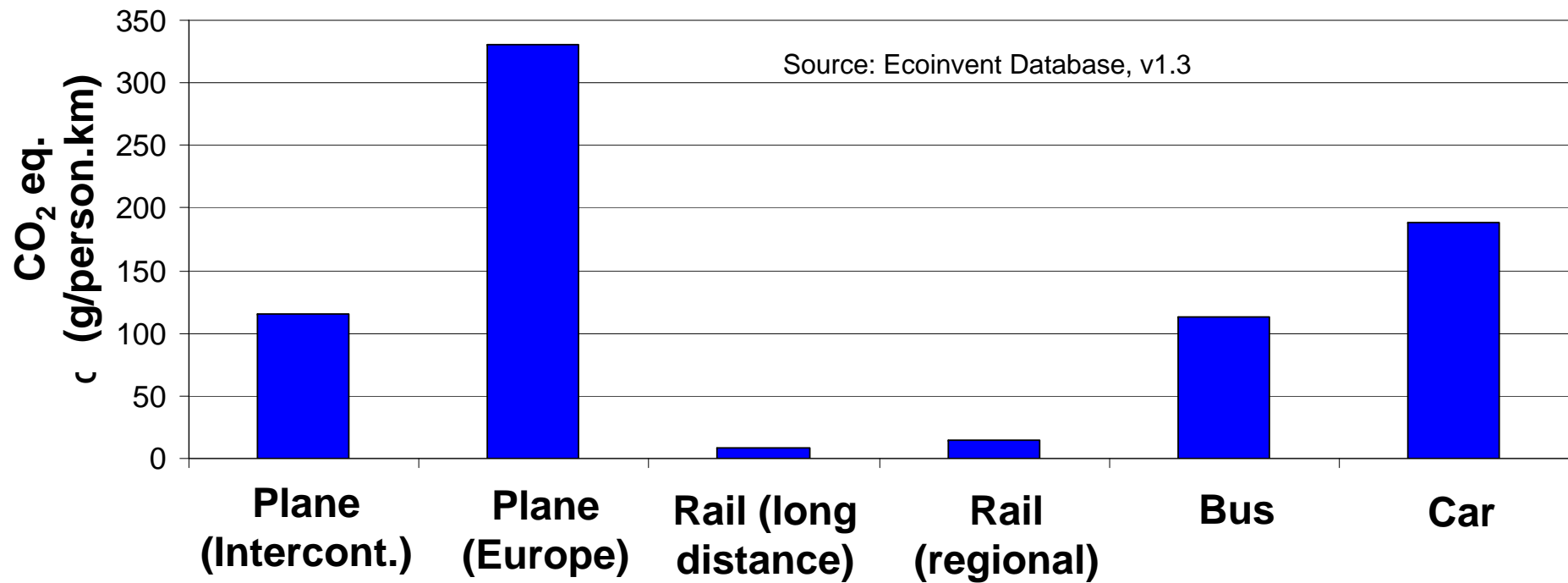
Energy technologies: Carbon footprint vs other life cycle impacts



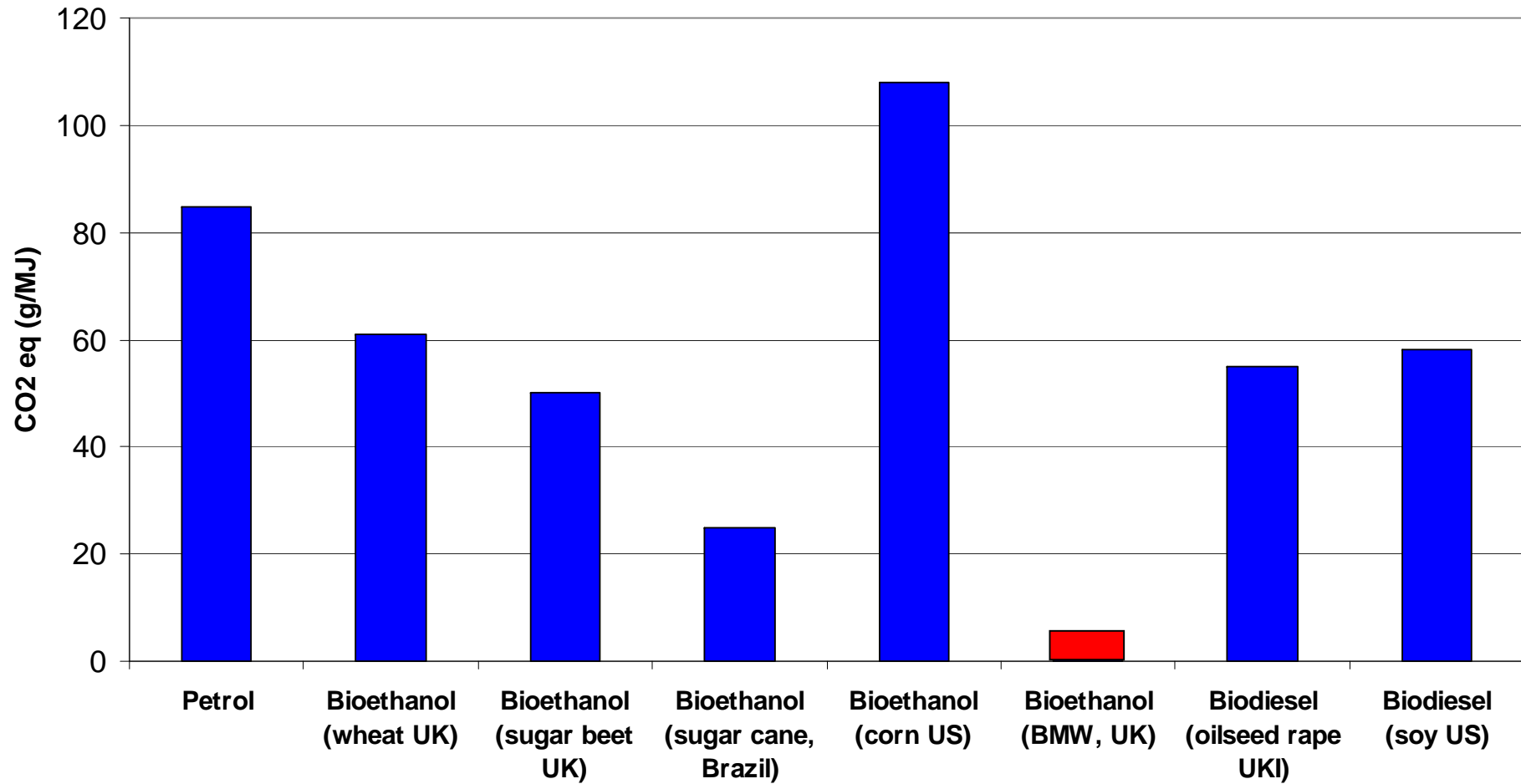
The life cycle of transportation



Comparison of different transport modes



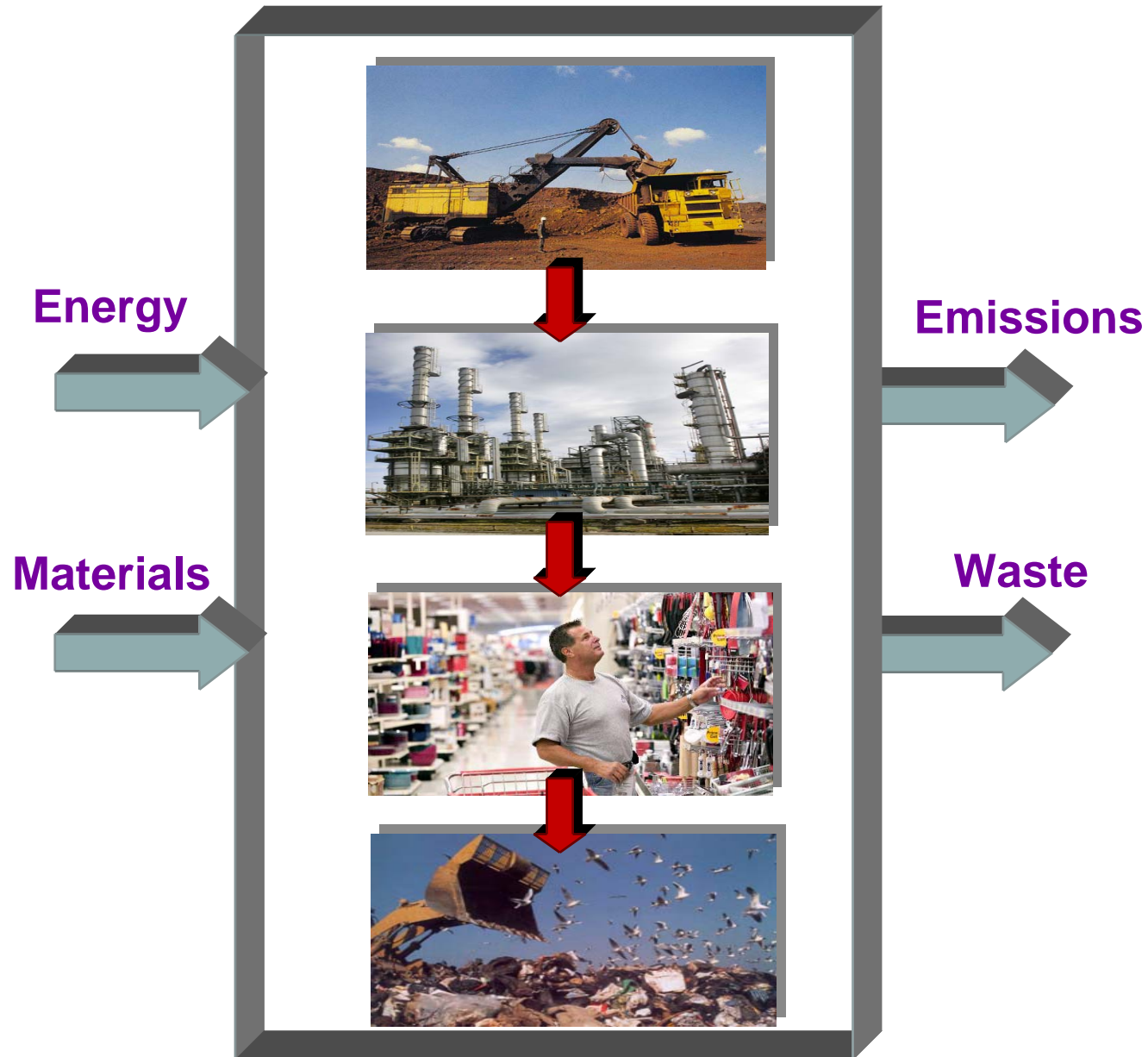
Carbon footprint of different fuels



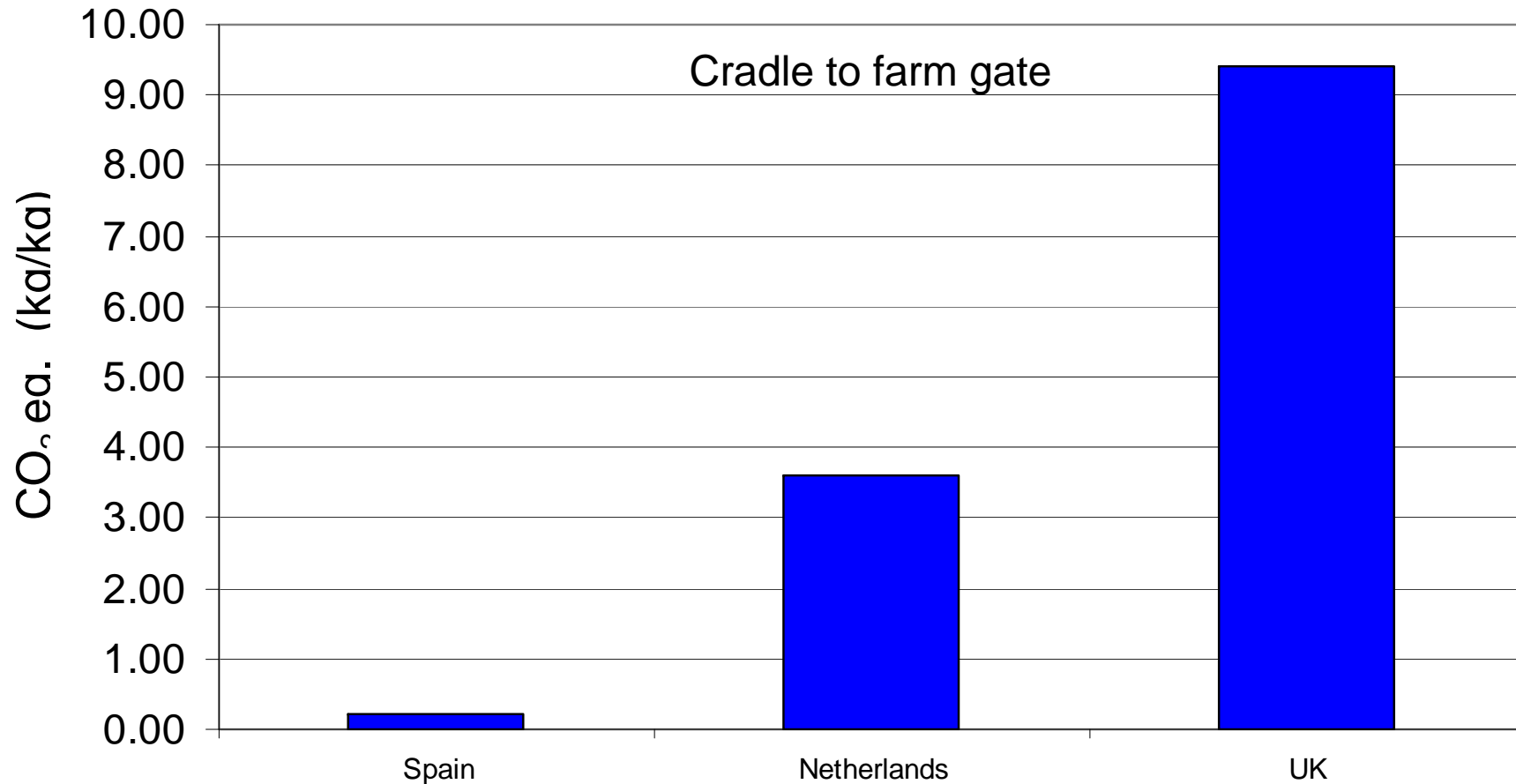
 Stichnothe and Azapagic, Resources, Conservation & Recycling, 2009. Resources, Conservation & Recycling. In press.

 Carbon and Sustainability Reporting within the Renewable Transport Fuel Obligation. Government Recommendation to RTFO Administrator. Department of Transport (DFT), June 2007

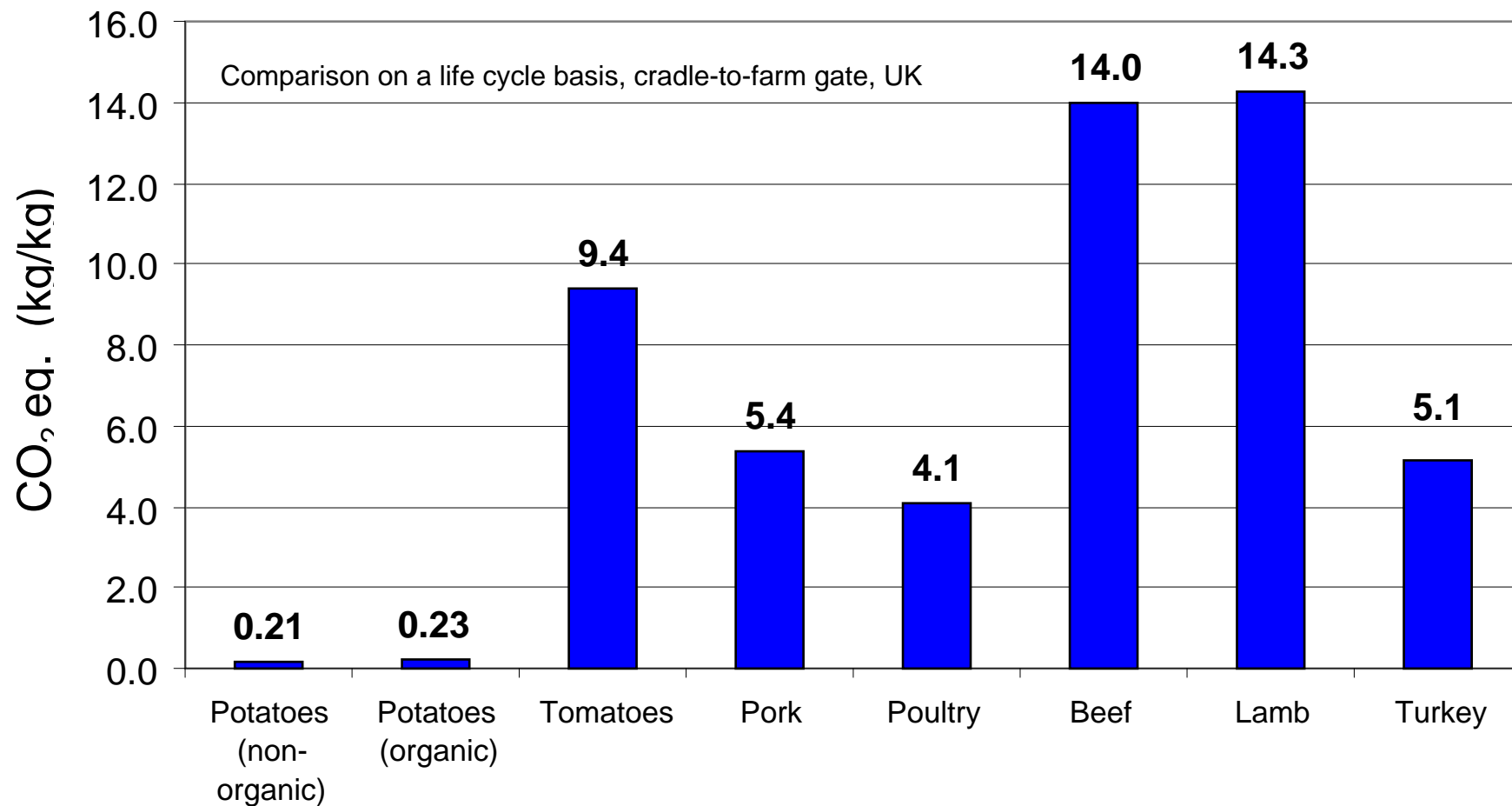
The life cycle of consumer products



Carbon footprinting food: Tomatoes in different countries

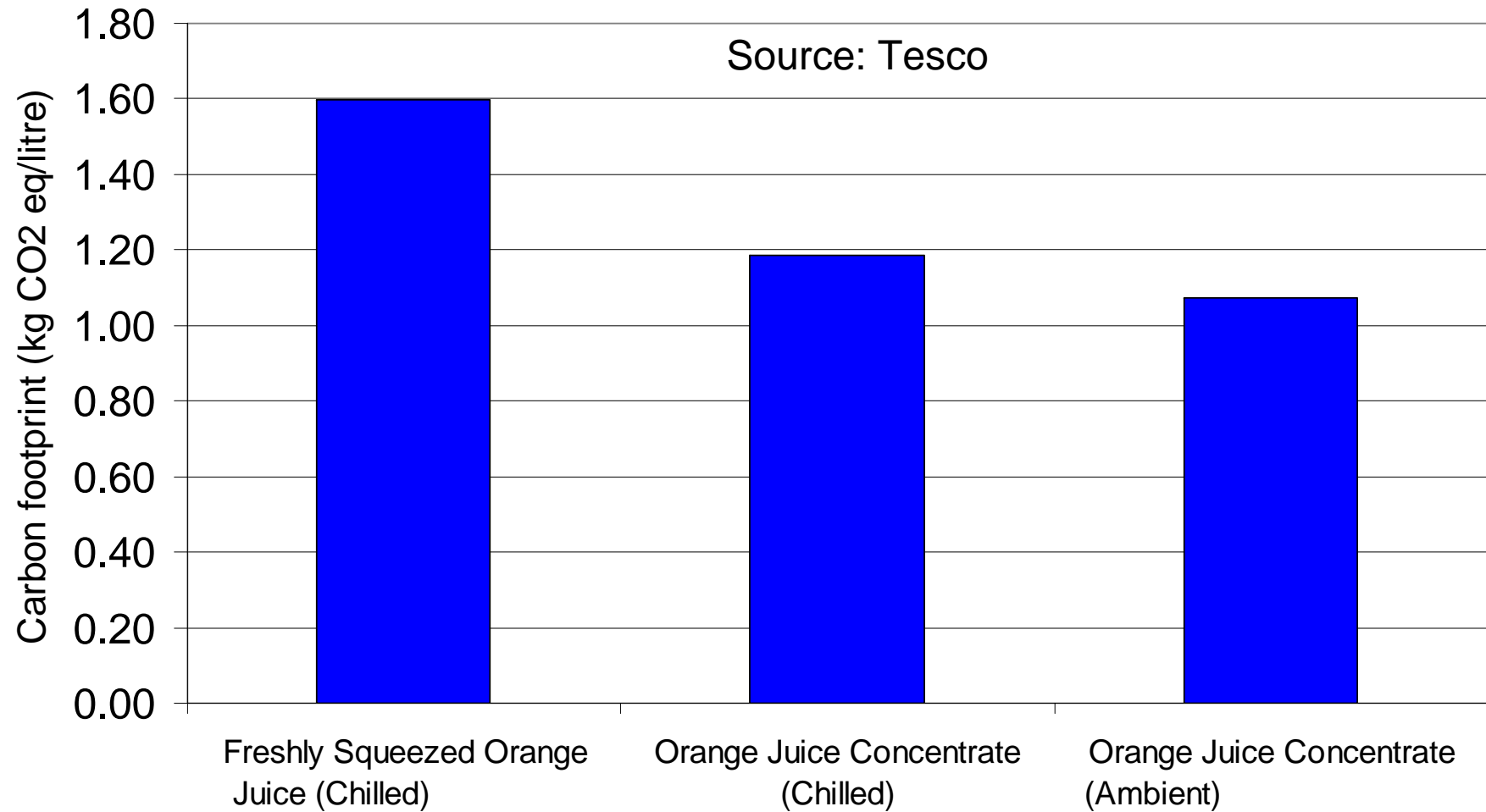


Carbon footprinting food: Meat vs vegetables

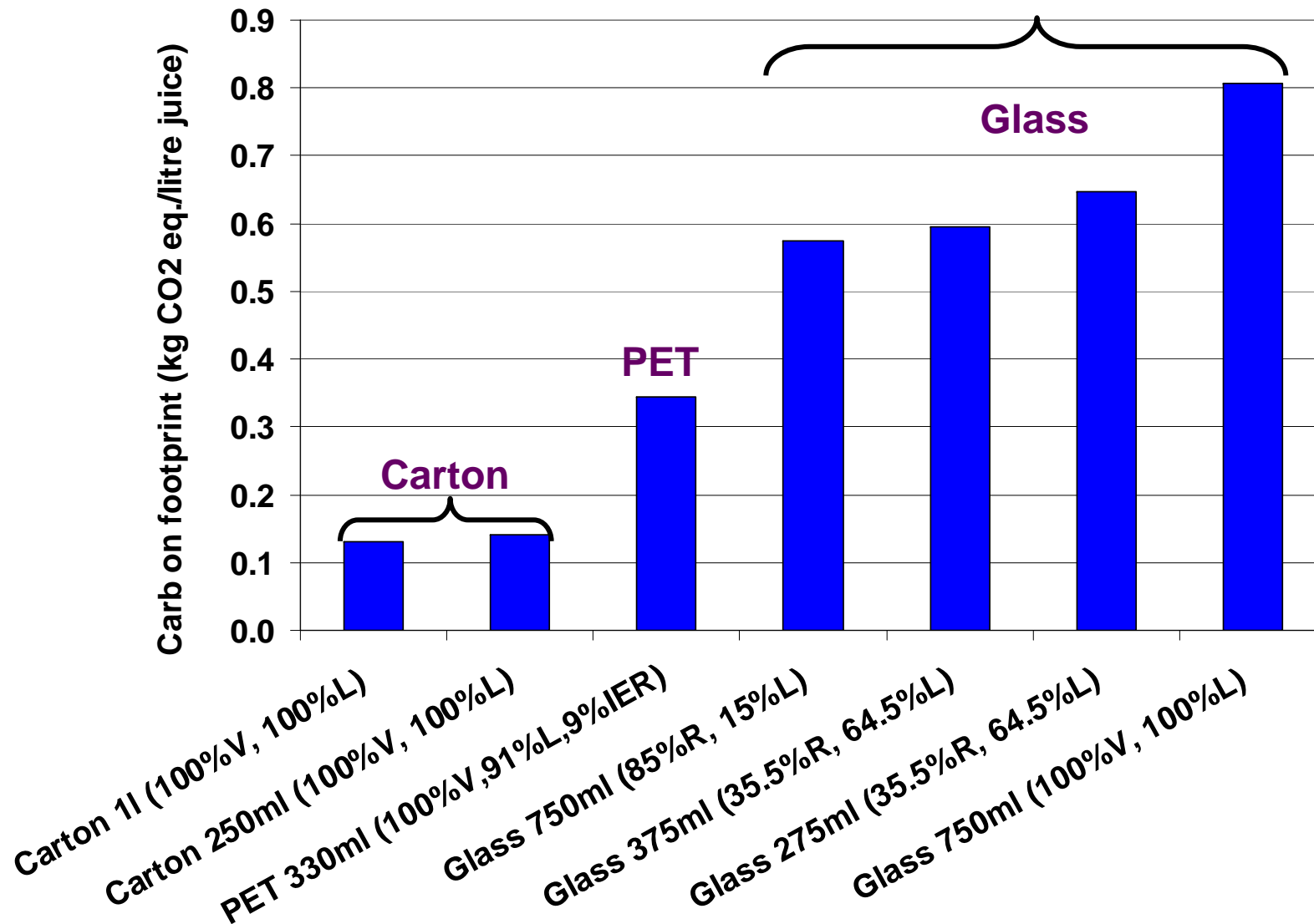


Williams, A.G., Audsley, E. & Sandars, D.L. (2006) Final report to Defra on project IS0205: Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities. London: Defra.

Carbon footprint of orange juice (in carton packaging)



Carbon footprint of juice packaging



Haruna Gujba and Adisa Azapagic, SCI, The University of Manchester.

Carbon labelling



<p>working with the Carbon Trust</p>	<p>The carbon footprint of this lightbulb is 6.5kg per 1000 hours of use and we have committed to reduce this</p>
 <p>6.5kg Equivalent conventional lightbulb 34kg</p>	<p>By comparison the footprint for the equivalent conventional lightbulb (60w) is 34kg per 1000 hours use</p>
<p>CO2 per 1000 hrs of use</p>	<p>Recycling the bulb at the end of life will help preserve the environmental benefits</p>

Conclusions

- ◆ Life cycle assessment can help towards sustainable management of ecosystem services
- ◆ Mainly used for provisioning services but contributes to improving supporting, regulating and cultural services
- ◆ Important to consider a wide range of environmental impacts and socio-economic aspects
- ◆ Particularly important to make trade-offs clear

