Quantifying and Benchmarking Environmental Performance of Companies: LCA for Socially Responsible Investments

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Growing interest in Socially Responsible Investments also driven by risks

Dow Jones Sustainability Indexes

Socially responsible investing (SRI) in US remained robust during 2001 and 2002, even as investment world was stagnant. Assets in socially screened portfolios climbed to $2.15 trillion in 2003, an increase over the $2.01 trillion counted in 2001.

Socially responsible mutual funds counted by the 2003 Trends Report increased in number to 200 in 2003, up from 181 in 2001, 168 in 1999, and 139 in 1997. Assets in socially screened mutual funds identified by the Trends Report grew by 19 percent, to $162 billion, up from $136 billion in 2001.

1. Decision and research questions

1. How to assess and benchmark corporate environmental performances?

2. What is the current practice in reporting of quantitative corporate environmental data?
   → How to compare and check such data?

3. How can life cycle approaches contribute to improve the quality of quantitative corporate environmental data?

4. On which basis to benchmark companies → basis for a sustainability Index

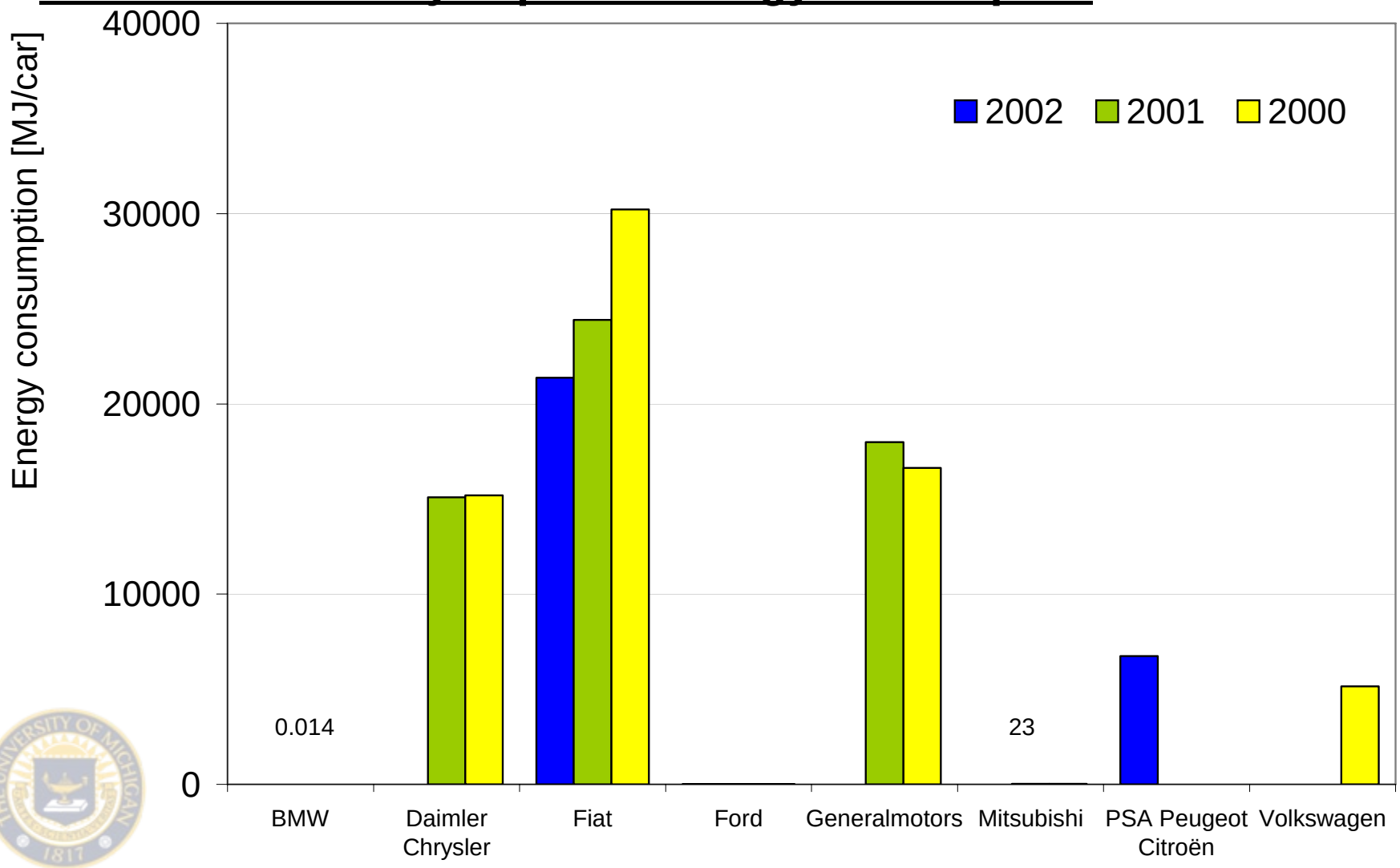
Classic approach: Analysis of what companies say
Data from environmental reports

(12 automotive companies, 2004)

Environmental indicator	Unit	Frequency
Energy consumption (non-renewable and renewable)	GWh	11/12
Water consumption	m^3	11/12
Industrial waste	tons	10/12
GHG (CO_2 eq. or CO_2) emissions	tons	8/12
VOC emissions	tons	6/12
Common waste	tons	5/12
Discharges to water	m^3	5/12
Environmental (protection) investments/expenditures	Euro	4/12
Nitrogen oxide	tons	2/12
Carbon monoxide	tons	1/12
Particles, dust	tons	1/12

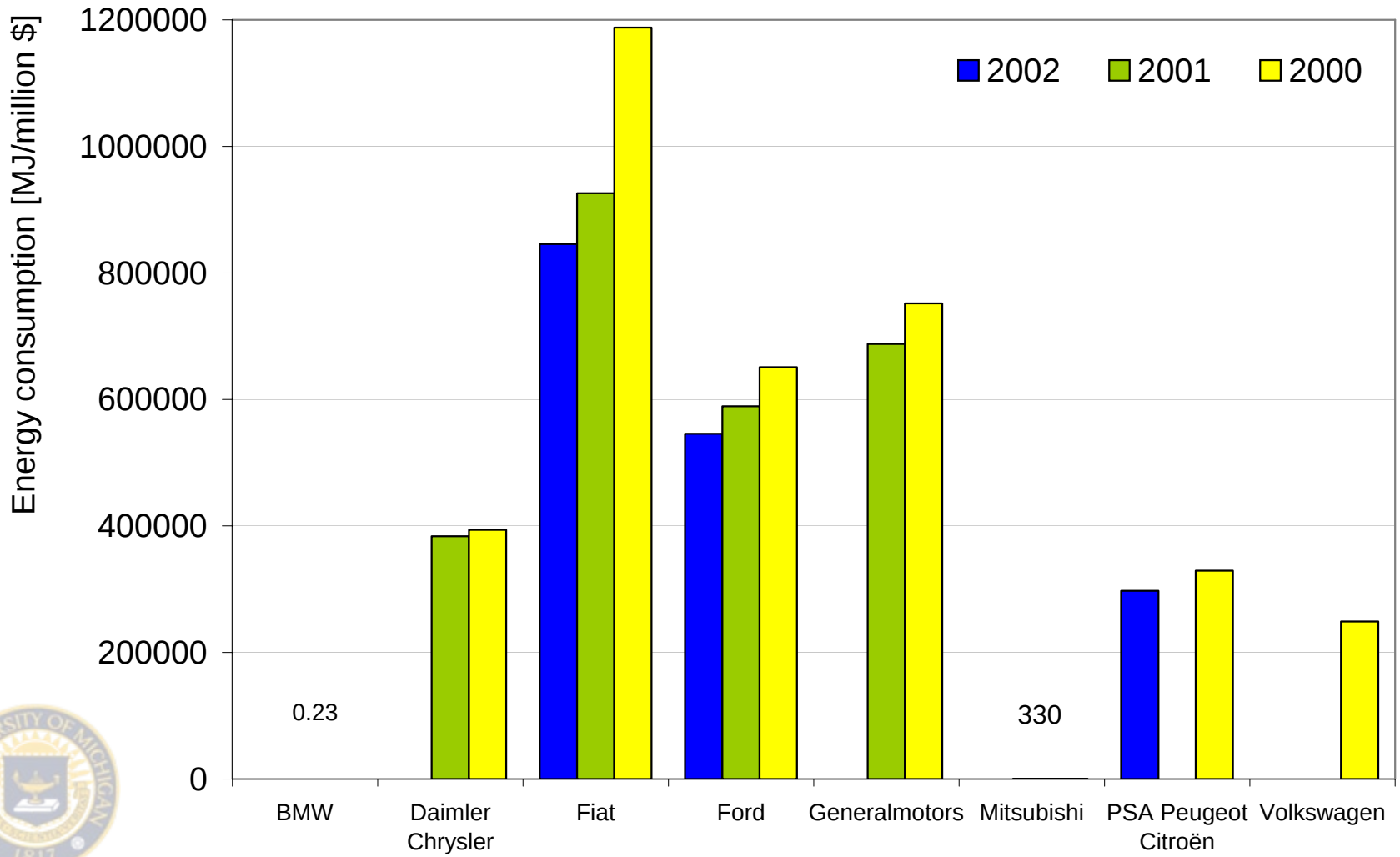
Comparable basis for comparison ! Comparison per unit vehicle

Automotive industry: reported energy consumption

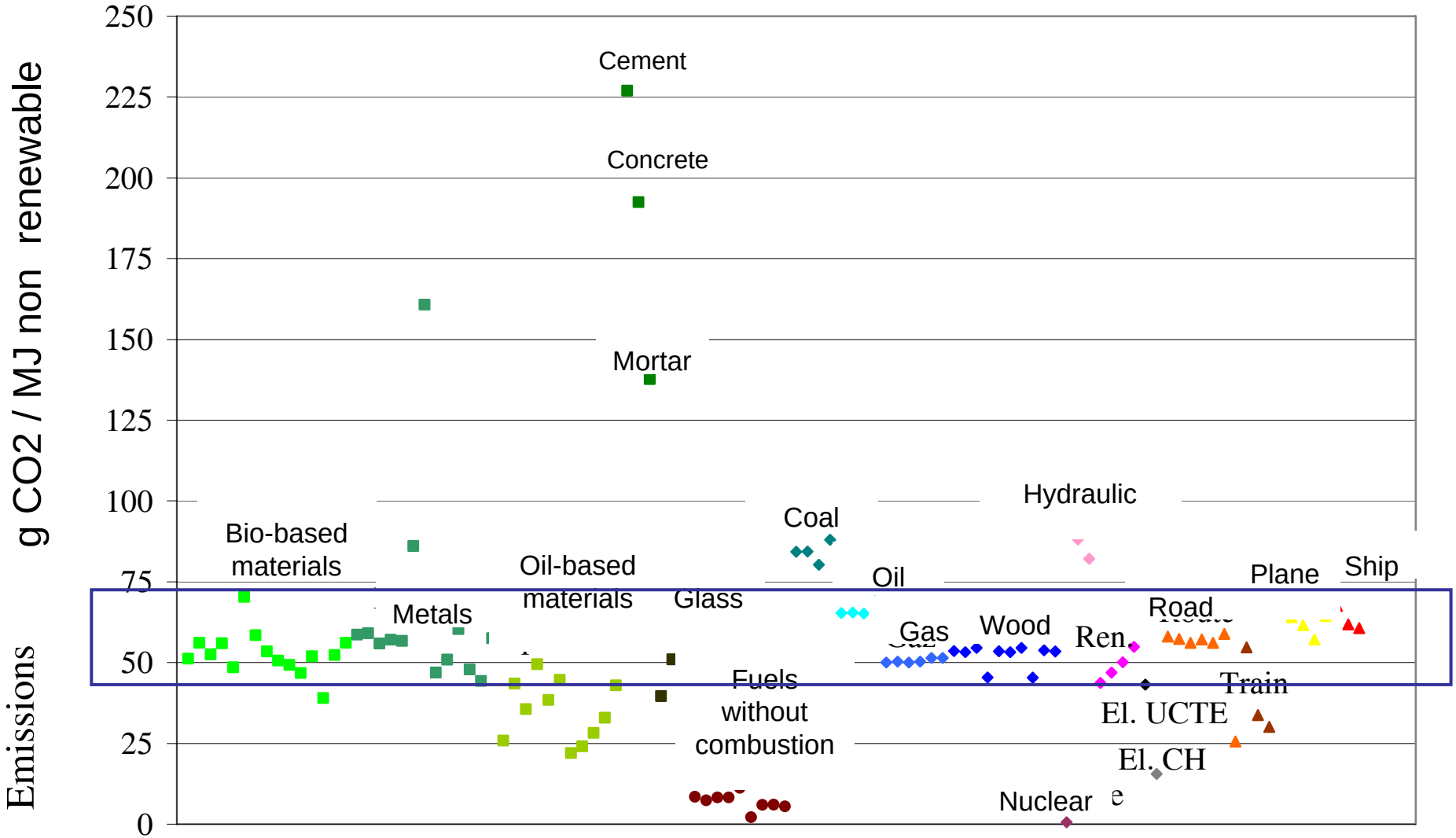


Comparable basis for comparison per unit turnover or per unit added value

Automotive industry: reported energy consumption



Check data, e.g.: g CO2 per MJ non renewable primary energy



Ratio [CO_2 (eq.) / final energy]

Banks	Ratio: GHG / final energy [gCO_2 / MJ]
ABN AMRO	56
Banca Monte Paschi Siena	141
Citigroup	115
Credit suisse group	141
HBOS	111241
KBC	48
Royal Bank of Scotland	87
San Paolo IMI	117
UBS	106
Westpac Banking	345

Automotive companies	Ratio: GHG / final energy [gCO_2 / MJ]
BMW	89
Daimler Chrysler	108
Ford	97212
Generalmotors	79
PSA Peugeot Citroën	35

Expected values: 50 – 100 gCO_2 (eq.) /MJ final energy

3. New approach based on company life cycle performances

Classic approach:

Analysis of what companies say

Analysis of:

- Transparency (env reports)
- Environmental policy
- Environmental mgt system
- Data on production
- Environmental impact of products/services

Many criteria !

New approach:

Analysis of what companies really do

Analysis of:

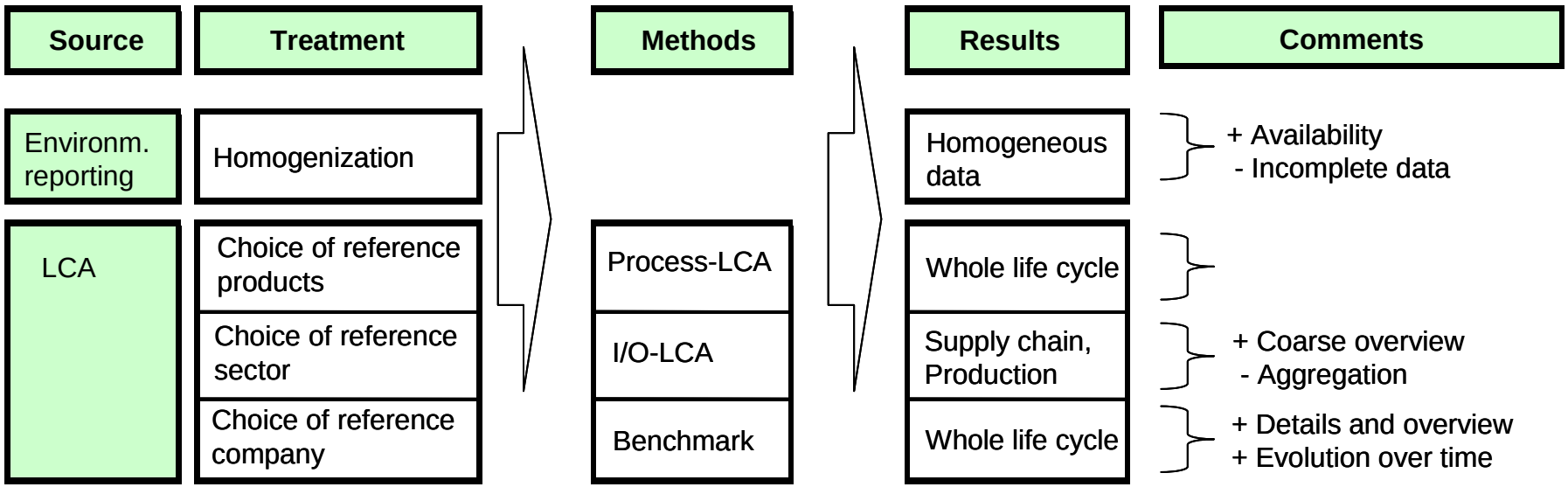
- Environmental impact of products/services over the whole life cycle

Less criteria but more relevant !

Source: Study of car manufacturers, Y.Maillard, Centre info February 2005.

Methodology to compare quantitatively corporate environmental performances

I. Data preparation



II. Validation of data and benchmark comparisons

Comparison of companies within industry sectors and life cycle analysis per economic sector →

Identification of the most important environmental impacts

I. Comparison of corporate environmental data to sector specific I/O-LCA data

1. Choice of a company
2. Distribution of the turnover (branches, segments)
3. Determination of corresponding Input/Output economic sectors and main products of the company
4. Computation of environmental indicators for each product and economic sector
5. Weighting and aggregation of I/O values to represent the considered company
6. Comparison with environmental report

Example: Peugeot Citroen PSA

Product/Segment	% of turnover in 2002	Related I/O sector
Automobile manufacturing	76%	Motor vehicles and passenger carbodies
Automotive equipment manufacturing	17%	Motor vehicles parts and accessories
Transportation and logistics	5%	Trucking and courier services, except air
Financing and other businesses: motorcycles, armored vehicles, engineering, engine	2%	Financial services

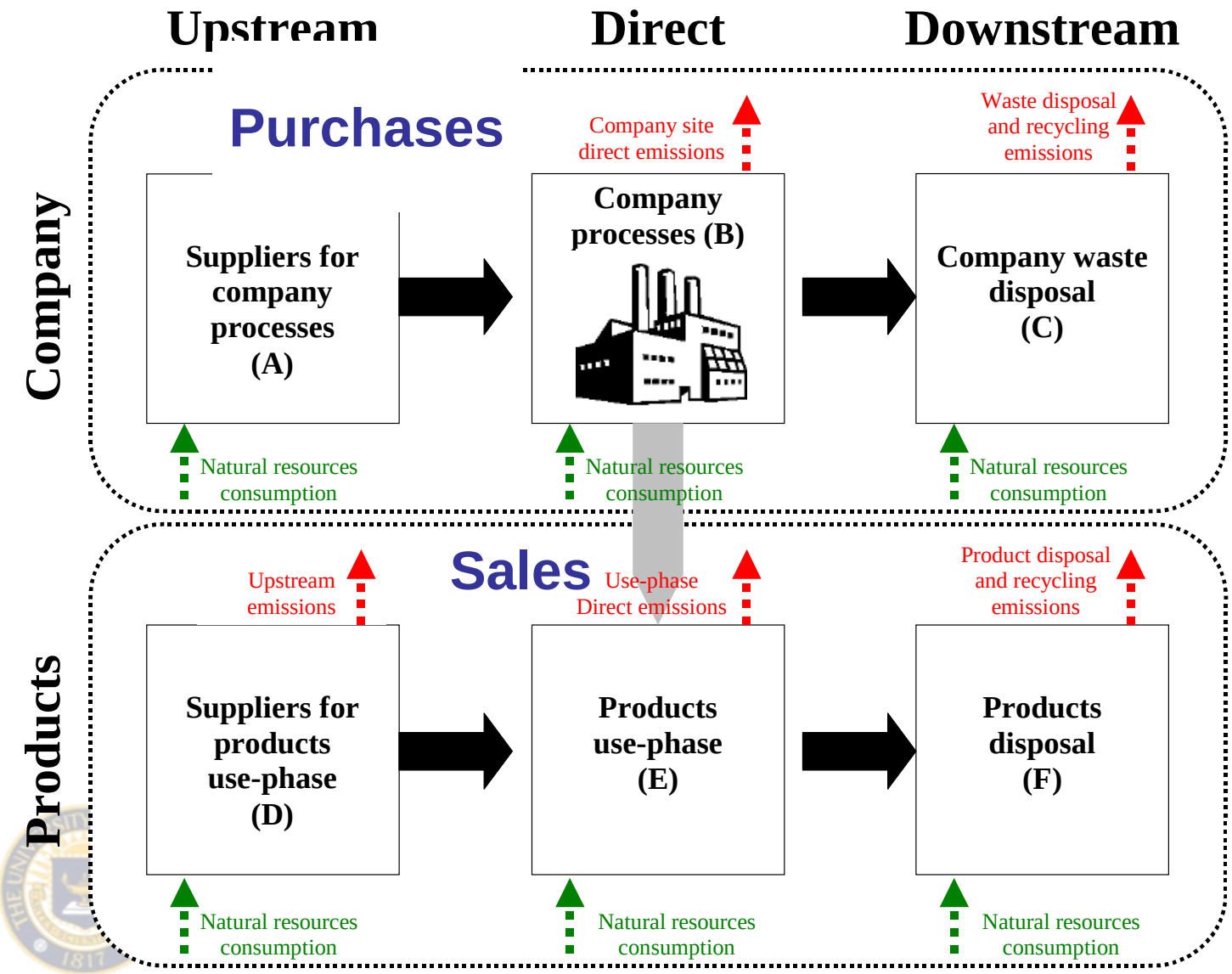
II. Key environmental impacts in 3 sectors

- **A. Pharmaceuticals**

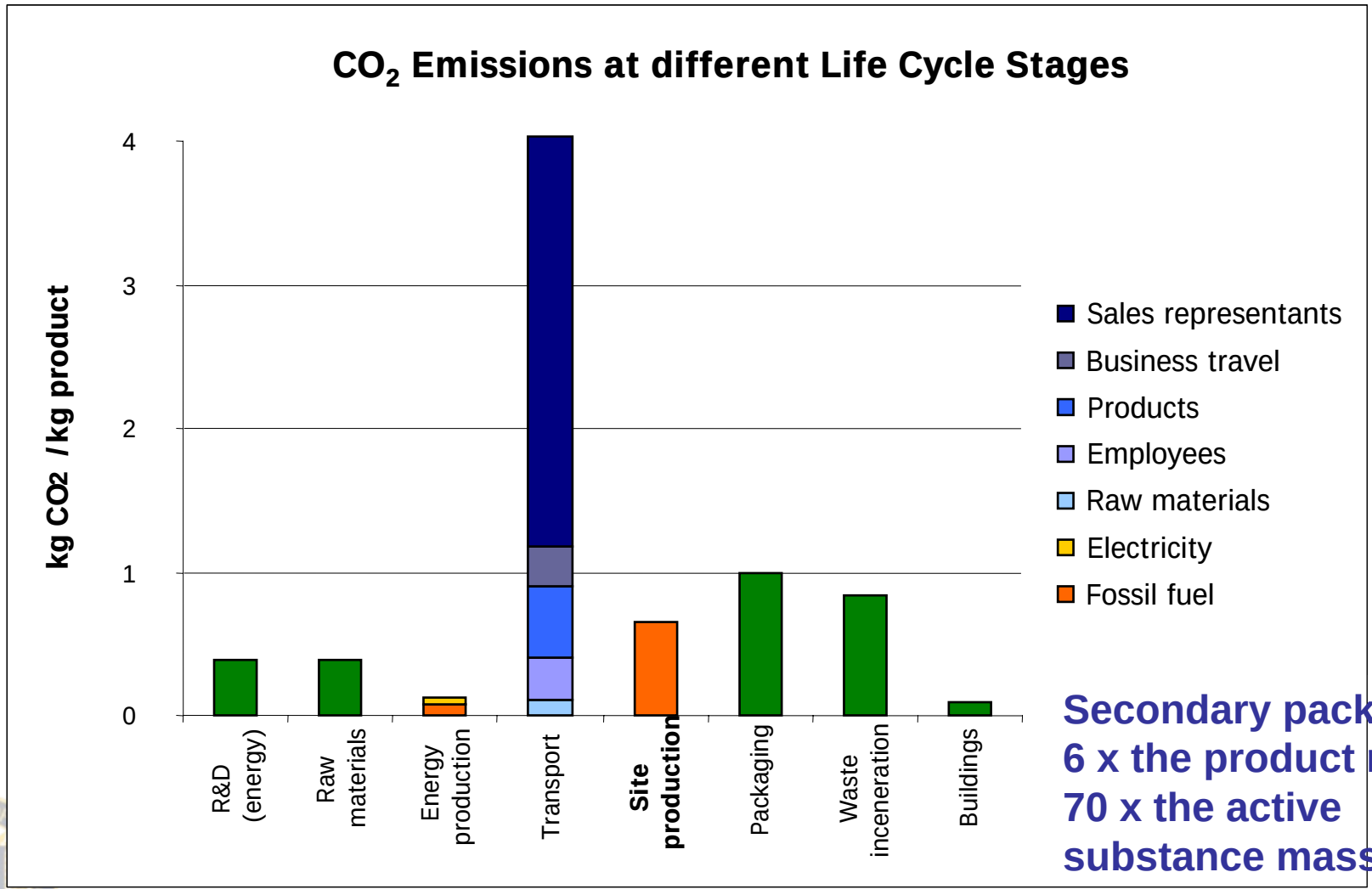
- **B. Telecommunications**

- **C. Car industry**

Corporate environmental performances
Company's Life Cycle System



A. CO_2 Emissions Pharma Industry



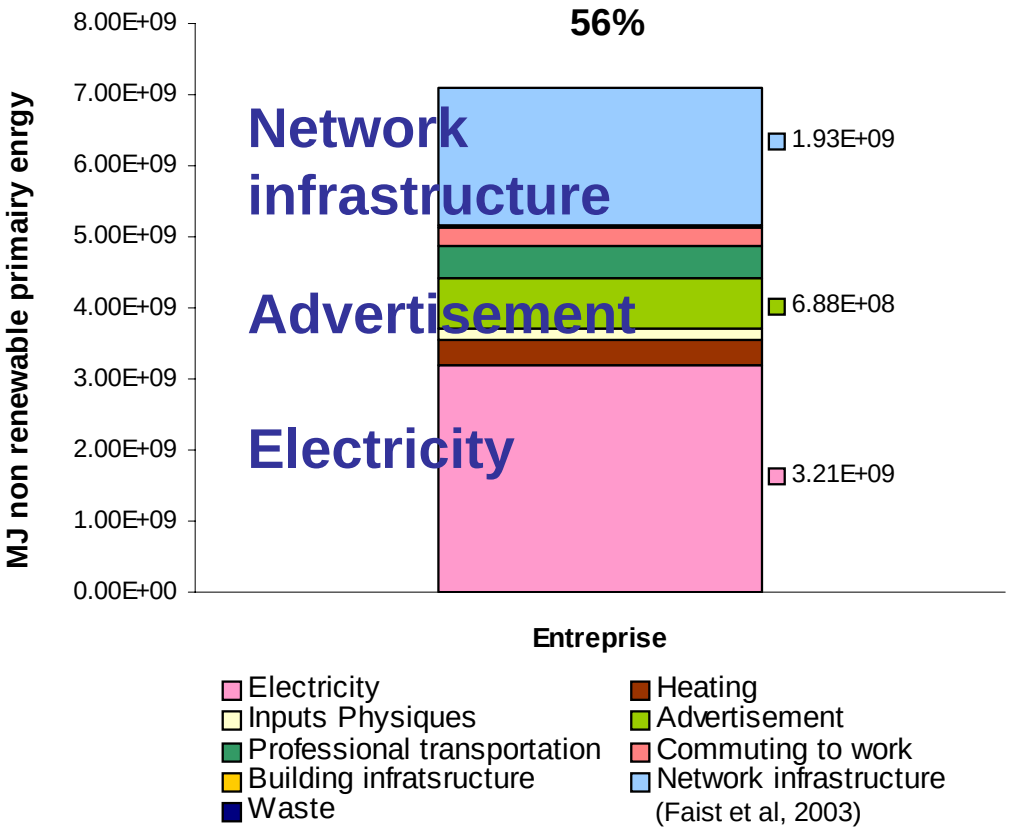
Secondary packaging
6 x the product mass
70 x the active substance mass

B. Life Cycle Impact of a telecommunications operator

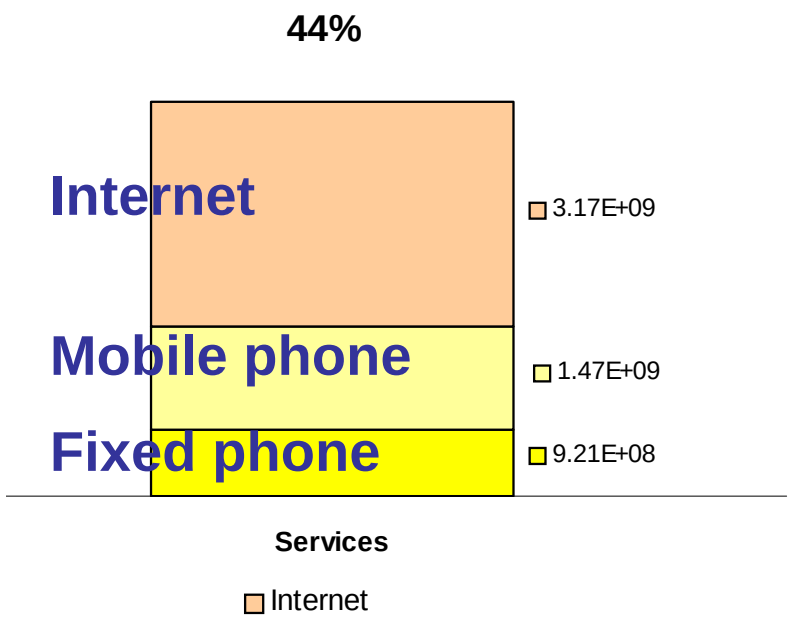
- **“Swisscom implemented an ISO 14001 EMS in 1997 → improved manifold its direct environmental performance.**
- **“Today, an extended control of the environmental impacts along the value chain is required by the latest ISO standard and expected from leading companies.”**
- **→ Quantify the environmental impacts of the whole Swisscom company, including the generally not considerd indirect impacts (New ISO 14001 version)**

Life cycle non-renewable primary energy Swisscom

Direct company impacts



Use of the service by customers



(ESU and ecoinvent databases)

Conclusions for Swisscom (P. Salina: sustainable manager)

Environmental report 2003 (direct) ⟺ **Case study (direct + indirect)**

CO_2 emissions:

30,300 t (8%) ⟺ **360,000 t**

"The magnitude of the indirect impacts is compelling and requires swift actions. Swisscom: →

- Purchasing criteria for terminal equipment

- Optimised cordless phones with low radiation & low energy

- Information to customers on the indirect impacts as well as new devices such as new modem"

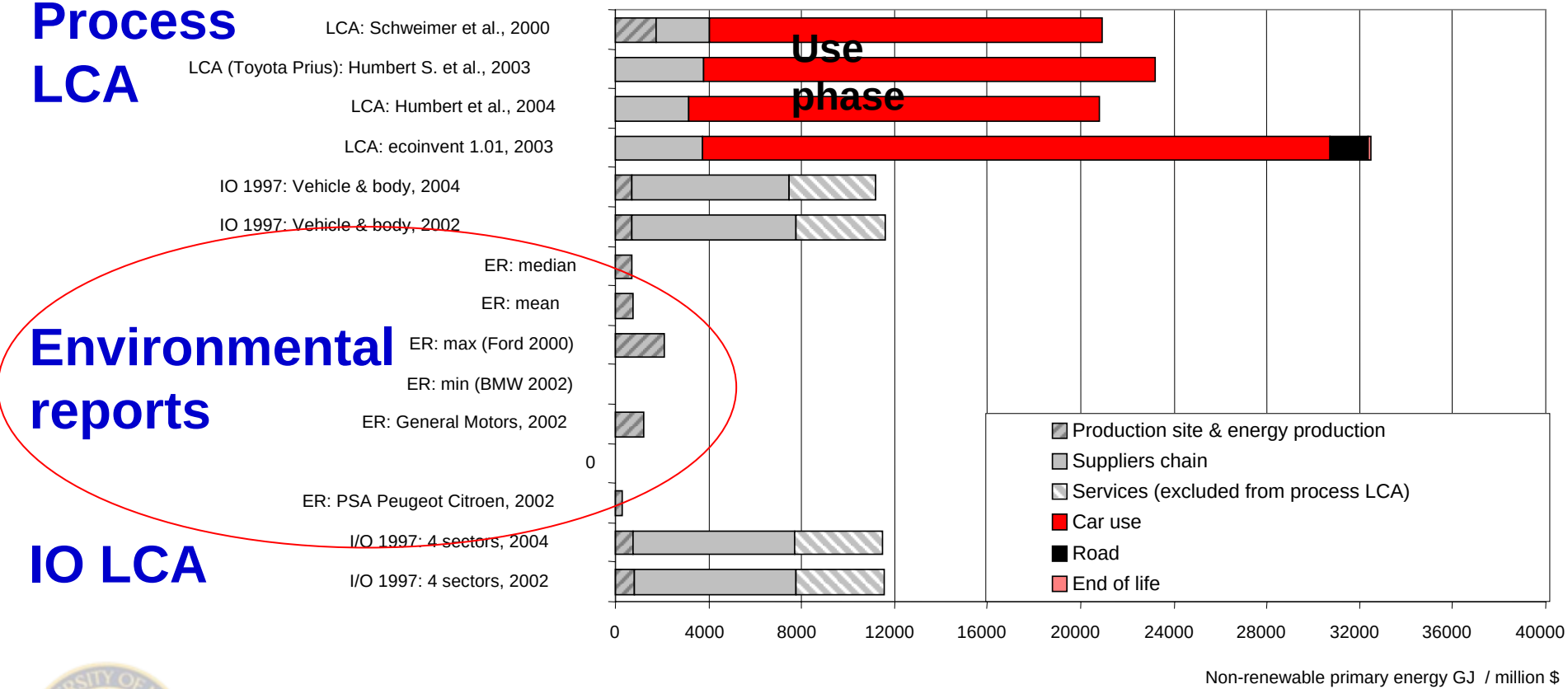
C. Company benchmarking for investors
E.g. benchmarking automotive companies

Non-renewable primary energy (GJ / million $ output)

Process LCA

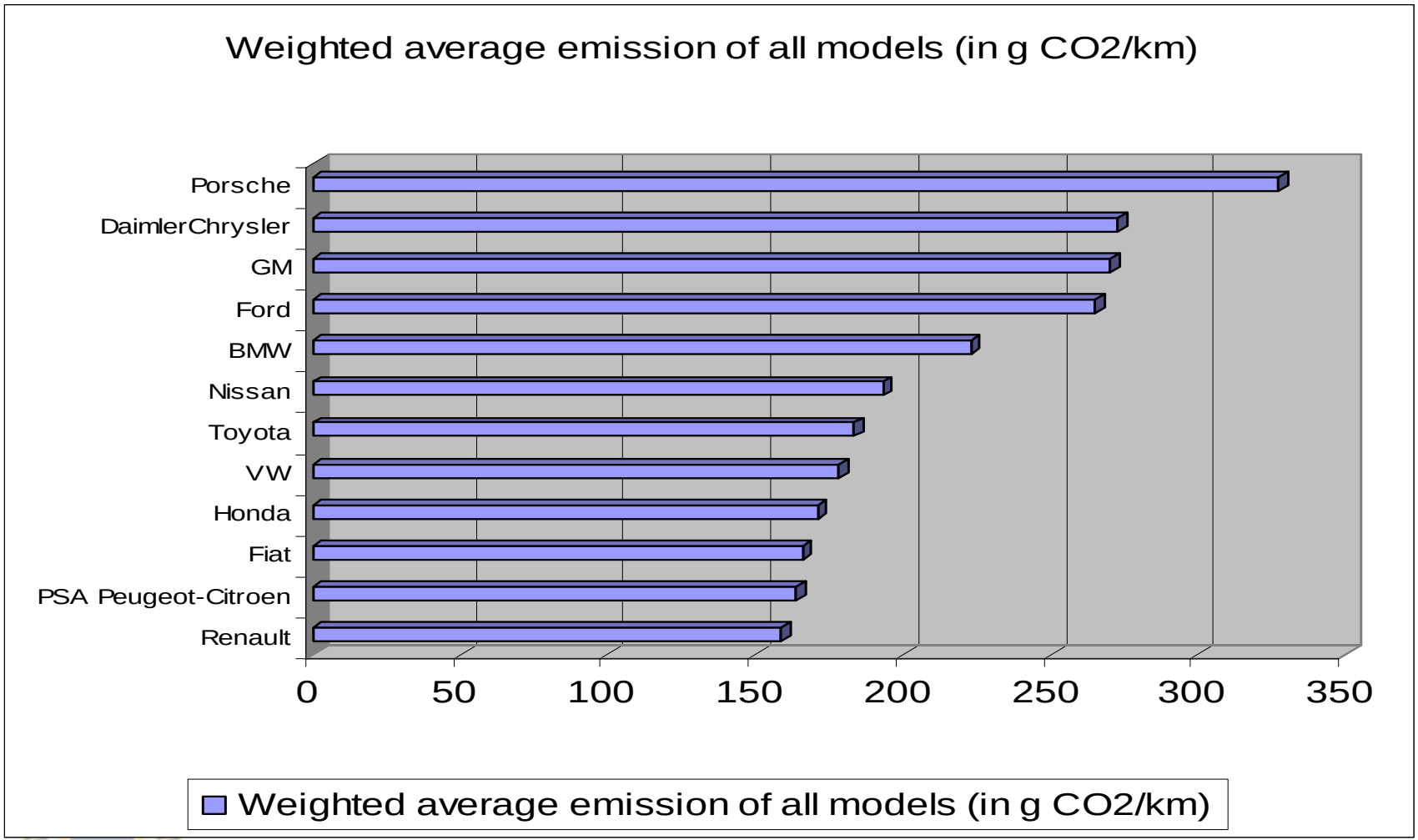
Environmental reports

IO LCA



Automotive Industry: much better ranking based on vehicles fleet sold in continent

Subindustry: Car Manufacturers



Source: Study of car manufacturers, Y.Maillard, Centre info February 2005.

5. Conclusions

- **Integrating reporting with LCA process and IO knowledge is crucial: developed a systematic way to achieve it**

- **Systematic assessment of groups of sectors with common function or similar characteristics**

→ **Identification of key life cyle phases/factors**

→ **Determination of a benchmark indicator**

- **A major step towards rewarding good behavior rather than good marketing!**

- **Challenge for several sectors: how to deal with**
  - **multiple applications (e.g. material sectors)**
  - **different purposes (road vs rail building)**

4. Benchmark based on Common Functional unit

Comparison per common functional unit:

- **Car Industry: g CO2 per km per car**
- **Oil, Gas & coal Industry: g CO2/GJ energy**
- **Air/Marine/Road Transportation:**
  g CO2/passenger or per ton transported x km

- **Account for carbon offset (e.g. number of plane passenger that offset their carbon for a given company)**

How to account for purpose?

We rank companies according to the purpose their products are used (we assess the indirect environmental impact of products)

Example: Construction companies: building a road is not the same as building a railway. Because rail is a better transportation mode than road.

Example: Insurance companies: insuring an aircraft is not the same as insuring insuring people's life.

Aluminum company: positive compared to steel for transport applications, not necessarily for buildings

Benchmarking: classic and new approach

Classic approach

Example:

Porsche has a very good env mgt system and a very good env policy: good company (even if cars are very polluting)

New approach

Example:

Renault sells the cars with the lowest CO2 emission per car: best company

Source: Y.Maillard, February 2005.

5. Conclusions
A University of Michigan Sustainability index

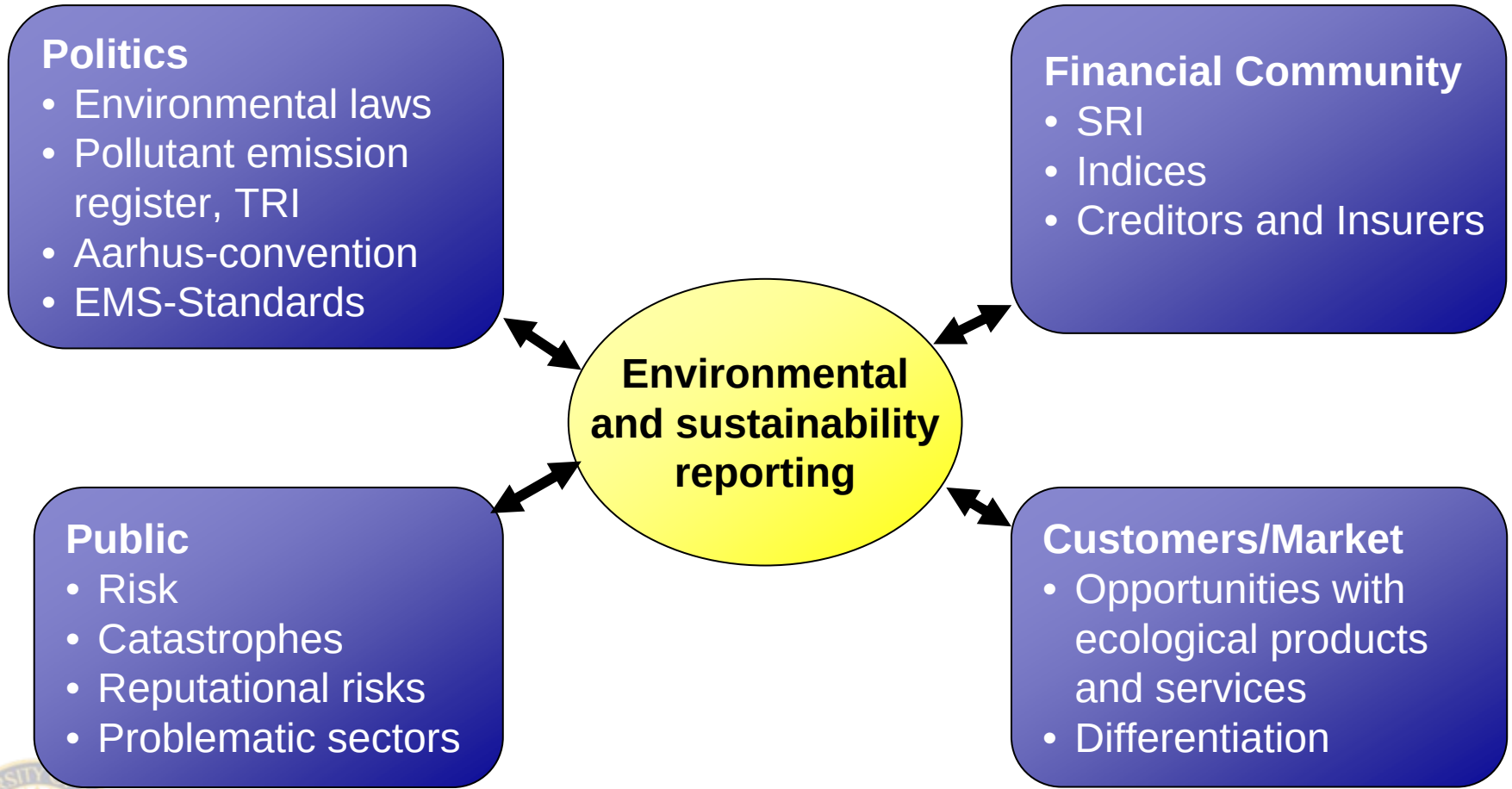
- → A University of Michigan Sustainability index
- integrating our respective knowledge recommendations for reporting
- → systematic assessment of groups of sectors with common function - similar characteristics
- identification of key life cyle phases/factors

Decision making for a company sutainability Index

- **1. How does investments affects sustainability performances ? How to address bad companies?**
- → reducing cash flow for a bad behaving company could even lead to worse behaviour

- **2. How to account for indirect environmental impacts:** e.g. should a chemical company be credited for the environmental benefits of polystyrene

1. Drivers for environmental and sustainability reporting



adapted from Dyllick T., „Umwelt und Nachhaltigkeitsberichterstattung", 23.11.2005 (2005) and Kolk A. (2003)

Stakeholders and (potential) use of quantitative corporate environmental data

Potential use of quantitative environmental data / Stakeholders	Environ-mental impacts	Legal comp-liance	Environmen-tal perfor-mance	Differentia-tion /Comparison	Risk and opportuni-ty
Creditors and insurers	x	x			x
Shareholders	x		x	x	x
Financial Analysts and Rating Agencies	x		x	x	x
SRI fund managers	x		x	x	x
Suppliers and contractors	x				
Employees and Management	x	x	x		x
Business Associations	x	x			
Customers	x		x		
Regulators and government officials	x	x			
Non-governmental organizations	x	x	x		x
Academia	x	x	x		x
Local community and neighborhood	x	x			x
Public (media etc.)	x	x			x

- There would be use if data were of sufficient quality

Check: g CO2 per MJ non renewable primary energy

Fossil fuels (transport + heat) :

oil, petrol, diesel, kerosene	55 - 70 gCO2/MJ (incl. 10g precombustion)
Natural Gas	50 gCO2/MJ
Coke	75 - 95 gCO2/MJ
Electricity (Europe)	43 gCO2/MJ
Electricity (CH supply)	16 gCO2/MJ
Electricity (CH production)	3 gCO2/MJ

Materials:

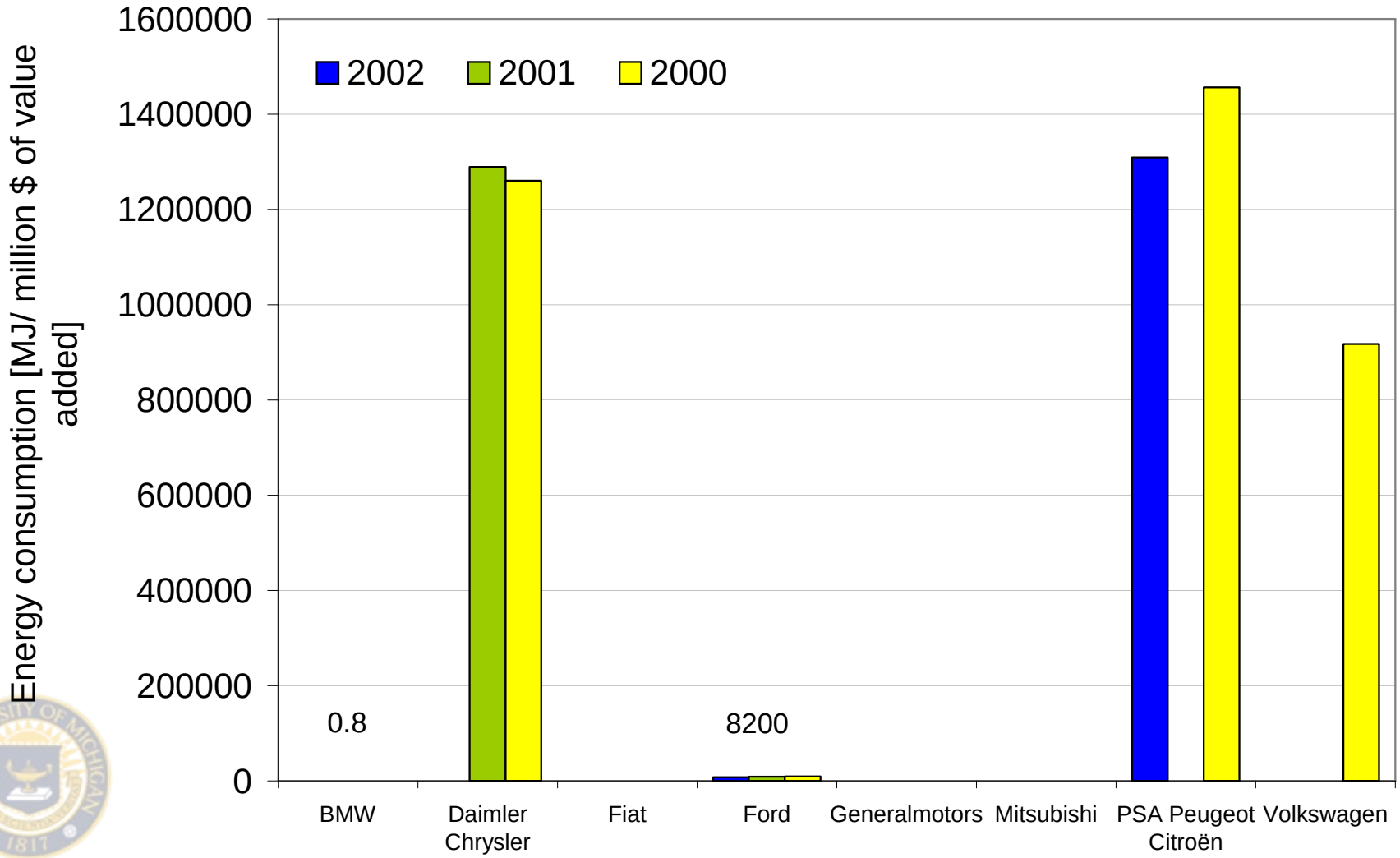
Fossil materials: plastics, etc.	60 gCO2/MJ env. (30g manufacturing, 30g elimination)
Metals: depends on % electricity and mix	Env. 50 gCO2/MJ
Concrete	190 gCO2/MJ
Cement	230 gCO2/MJ
Wood, cardboard, renewable energy	Also about 65 gCO2/MJ non renewable fixation not considered: only fossil CO2

Problem detection:

- If diesel, oil around 10 gCO2/MJ: combustion is not considered
- If plastics around 30 gCO2/MJ, EOL emissions have been neglected
- If renewable negative, EOL not considered, only fixation

Comparison per unit added value

Automotive industry: reported energy consumption



2. Reporting practices
Classic approach to compare companies

Classic approach:

Analysis of what companies say

Analysis of:

- Transparency (env. reports)

- Environmental policy

- Environmental management systems

- Data on production

Overview and links with costs