

# 3rd International Conference on Life Cycle Management

## Identification of environmental impact patterns of industrial sectors

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- eco-efficiency links economic efficiency with environmental efficiency
- different eco-efficiency indicators are established on a macro-economic scale
- indicators provide a basis to reduce efficiently the environmental impacts of industries for selected aspects
- furthermore a detailed characterisation of relevant sectors with regard to the diversity of environmental impacts is necessary

## Identification of environmental impact patterns of industrial sectors

- characterization of industrial sectors
- so far on a very aggregated level
- differentiated consideration of relevant sectors with regard to environmental impact patterns

## Identification of environmental impact patterns

environmental impact patterns comprehend two components:

- sectors which have a similar impact profile
- impact categories are induced by different industrial sectors

## The European Pollutant Emission Register (EPER)

- reporting according to the IPPC Directive of the European Union
- most important industrial emission sources should be known
- reporting requirement for companies, reporting triannual
- reporting by companies is compulsory:
  - for all categories of industrial activities listed in ANNEX I of the IPPC Directive
  - if threshold values of emissions are exceeded
- pollutants: 50 pollutants  
(37 pollut. into air, 26 pollut. into water), e.g:
  - CO<sub>2</sub>, NH<sub>3</sub>, dioxins
  - metals and compounds
- sectors are for example:
  - metal industry
  - chemical industry
  - waste treatment

### However:

### EPER is discontinued -> new: E-PRTR

- more pollutants
- more industrial sectors
- annual reporting
- pollutants in water, air and soil

## The European Pollutant Emission Register (EPER)

### Appropriateness for the determination of environmental impact patterns

#### advantage

- disaggregation
- extent of the reported emissions

#### problems

- threshold values
- not all industry classes are reported

## Data source for the determination of economic performance

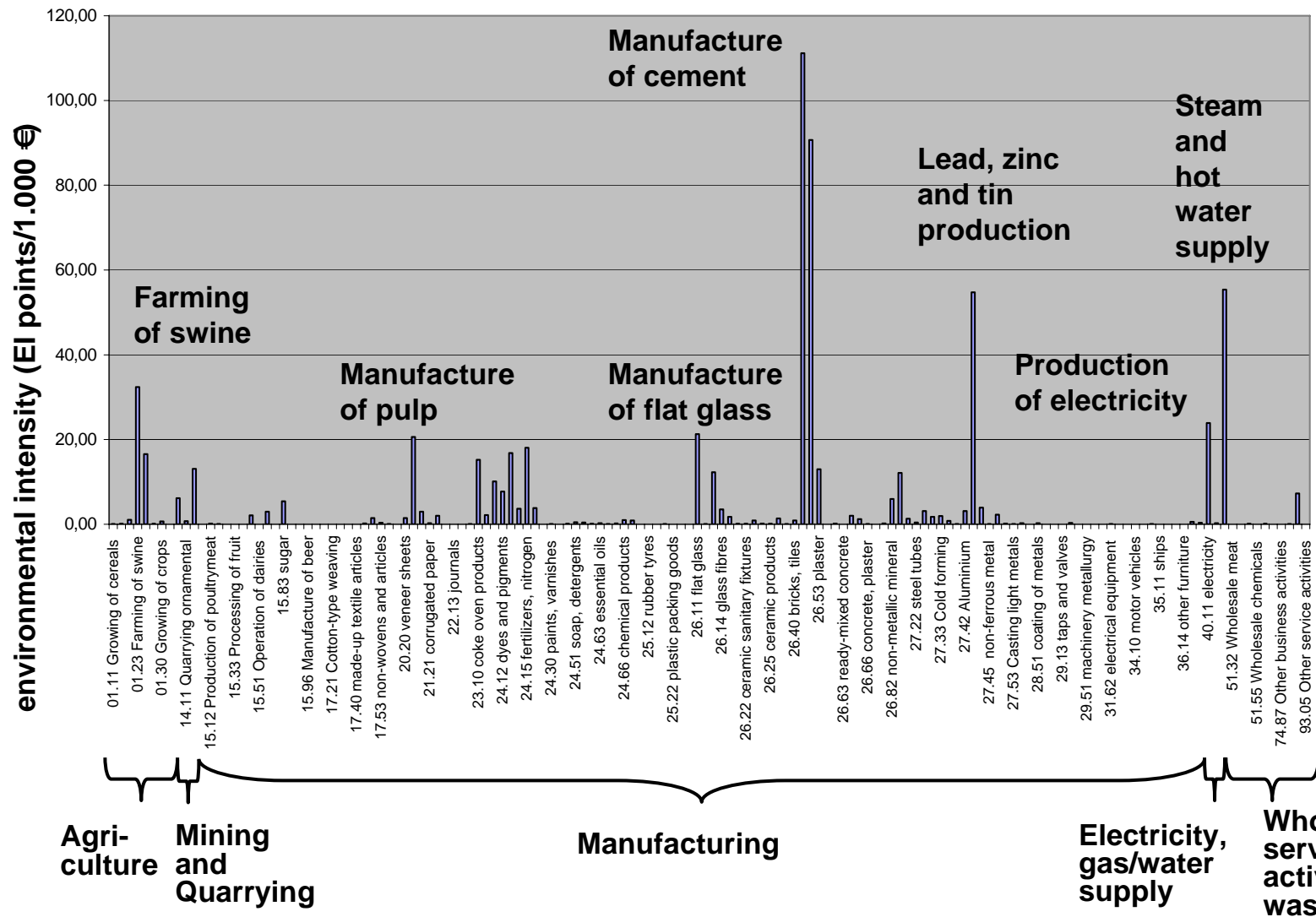
- statistical data on turnover, source: statistics on turnover
- advantage:  
the only consistent data source available
- problem:  
bias due to the value added

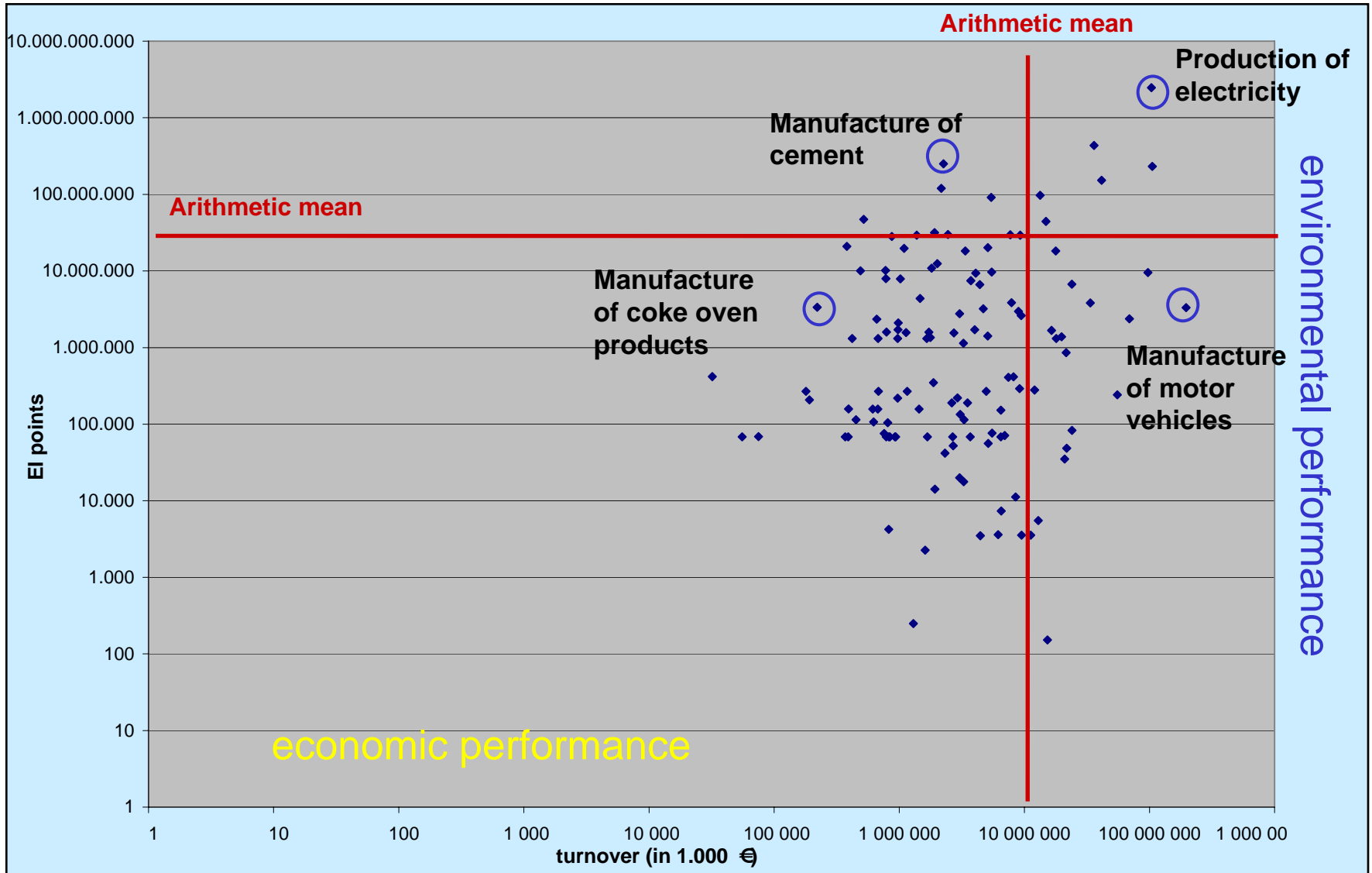
## Eco-efficiency application

- Identification of the absolute environmental impacts
  - reporting data on emissions
  - aggregation and assessment using a single score LCIA method (Eco-indicator 99)
  - unit: Eco-indicator points (EI points), a dimensionless figure
- Identification of the relative environmental impacts

environmental impact  
—————  
economic performance

- consistent classification at a disaggregated level (NACE, 4-digit level of industry classes),  
consistency between economic data and data on environmental performance

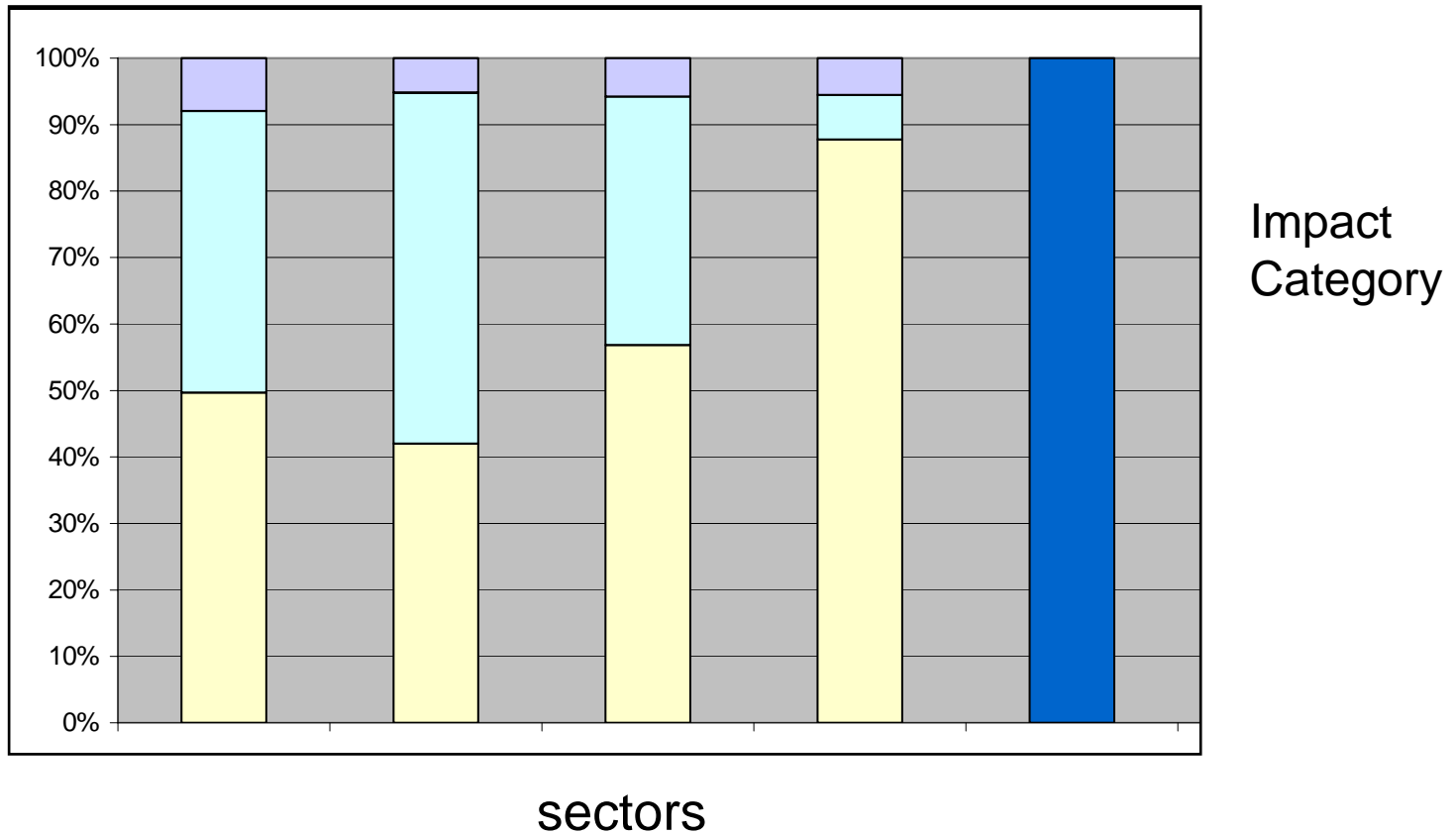




## Criteria for the identification of environmental impact patterns ...

- relating to absolute environmental impacts
  - relevance of impacts categories for industrial sectors
  - contribution of the different LCIA categories to the entire industry of a country
  - contribution of industrial sectors to impact categories
- relating to relative environmental impacts
  - contribution of industrial sectors to relative environmental impacts of impact categories

## Relevance of impacts categories to industrial sectors



## Relevance of impacts categories to industrial sectors

Industrial sectors, dominated of one impact category

(see figure)

*e. g. ecotoxicity:*

13.20 Mining of non-ferrous metal ores, except uranium and thorium ores

24.64 Manufacture of photographic chemical material

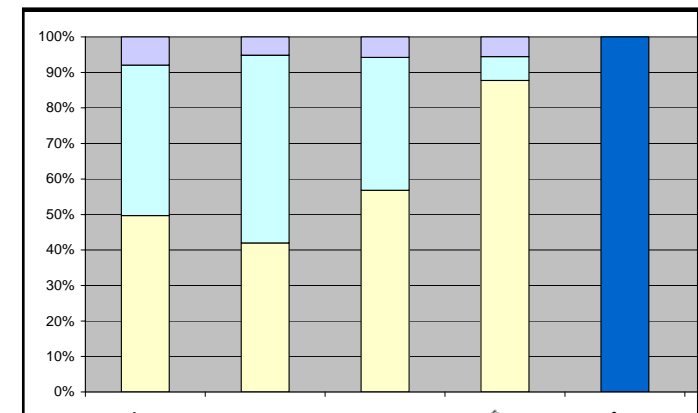
27.21 Manufacture of cast iron tubes

27.34 Wire drawing

27.54 Casting of other non-ferrous metals

29.13 Manufacture of taps and valves

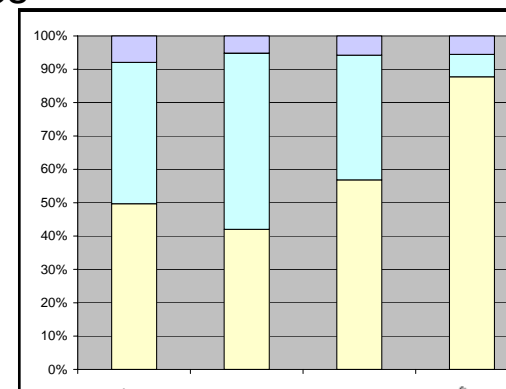
29.51 Manufacture of machinery for metallurgy



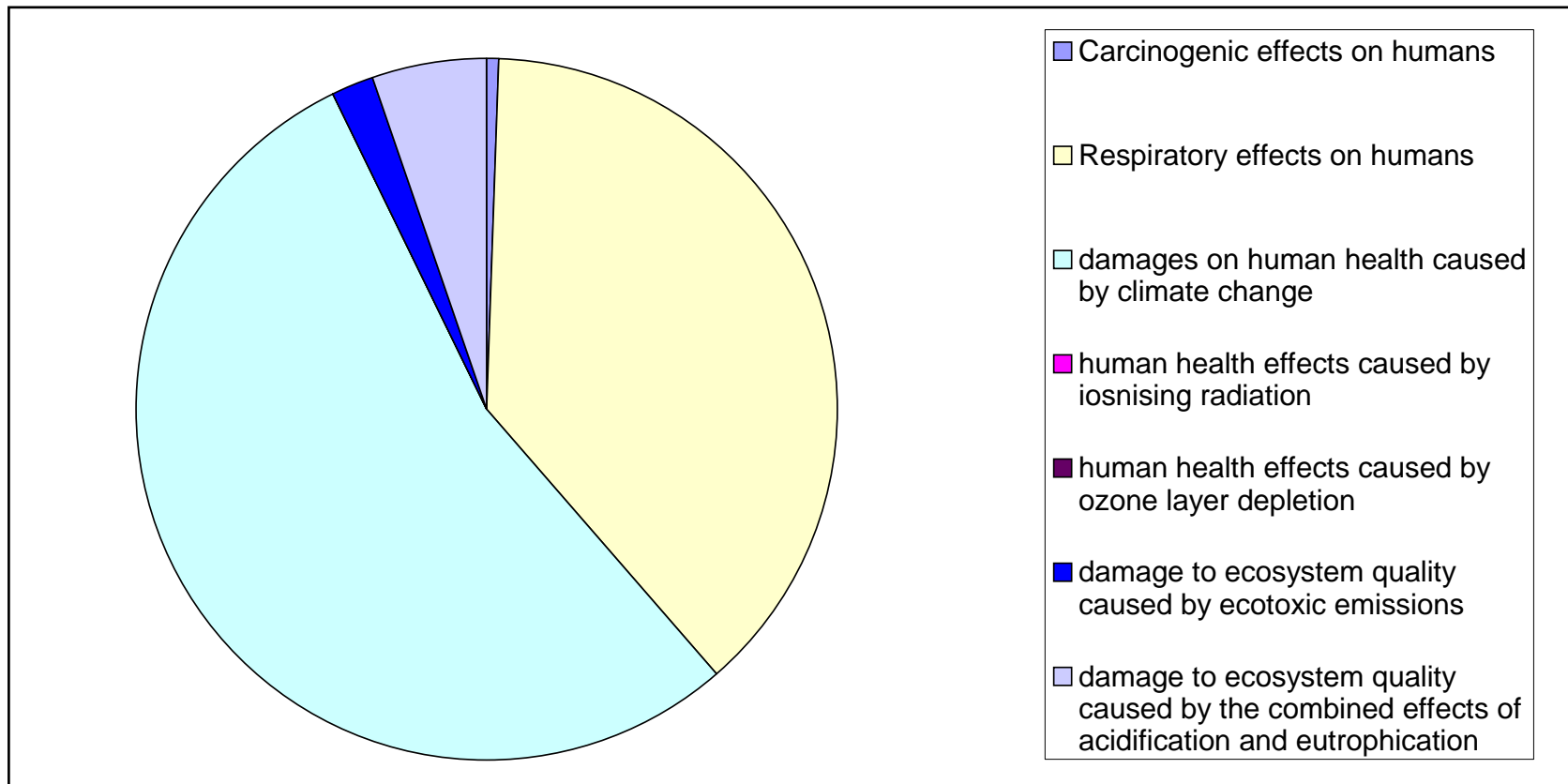
## Relevance of impacts categories to industrial sectors

### Similar patterns of industrial sectors

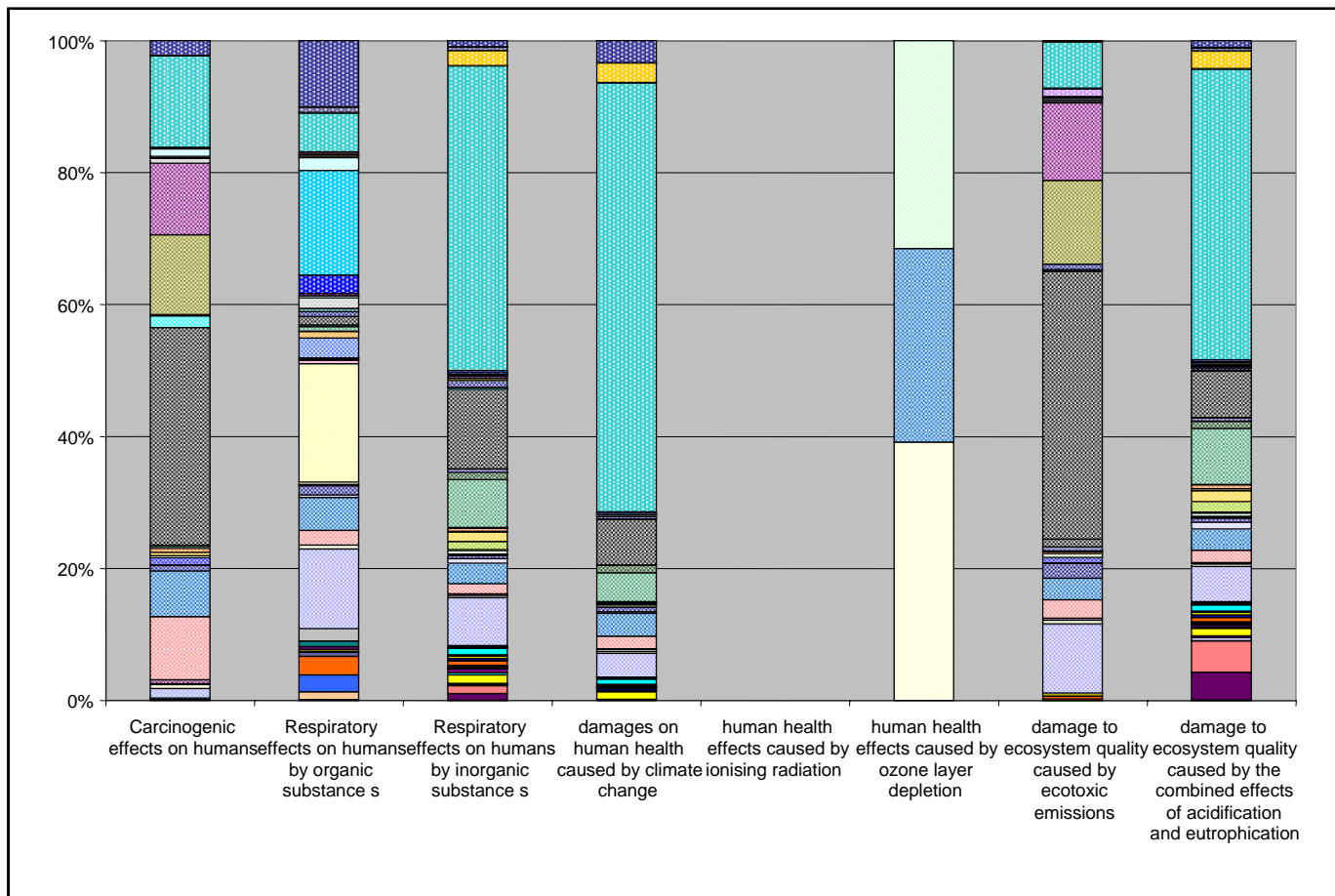
- *Agriculture*
  - > 60 % respiratory effects by inorganic substances
  - > 30 % effects of acidification and eutrophication
- *Mining and quarrying*
  - Mining: > 40 % respiratory effects by inorganic substances; exclusion: Mining of non-ferrous metal ores
  - Quarrying:
    - > 60 % climate change
- *Manufacture of food products and beverages*
  - > 40 % respiratory effects by organic, inorganic substances
  - production of meat: (similar to agriculture)
    - > 60 % respiratory effects by inorganic substances
    - > 30 % effects of acidification and eutrophication
- *Electricity, gas and water supply*
  - > 30 % respiratory effects by inorganic substances
  - > 30 % climate change
  - 5-10 % acidification and eutrophication



## Industrial sectors relating to different impact categories: contribution of impact categories to the total of the considered industrial sectors



## Industrial sectors relating to different impact categories: contribution of industrial sectors to impacts categories



## Industrial sectors relating to absolute environmental impacts

### impact categories dominated of industrial sectors

*z. B. Carcinogenic effects on humans: (90 %), listed top-down*

27.10 Manufacture of basic iron and steel and of ferro-alloys

40.10 Production and distribution of electricity

27.43 Lead, zinc and tin production

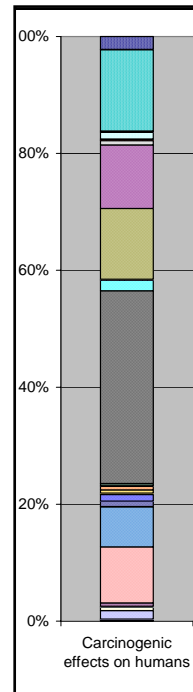
27.44 Copper production

24.13 Manufacture of other inorganic basic chemicals

24.14 Manufacture of other organic basic chemicals

90.00 Sewage and refuse disposal, sanitation and similar activities

27.35 Other first processing of iron and steel n.e.c.;  
production of non-ECSC ferro-alloys



## Industrial sectors relating to relative environmental impacts

### impact categories dominated by industrial sectors

*z. B. Carcinogenic effects on humans: (90 %), top-down listed*

27.43 Lead, zinc and tin production

27.44 Copper production

24.13 Manufacture of other inorganic basic chemicals

27.10 Manufacture of basic iron and steel and of ferro-alloys

27.31 Cold drawing

24.12 Manufacture of dyes and pigments

24.61 Manufacture of explosives

27.33 Cold forming or folding

- data uncertainties and methodological constraints impede the concise definition of distinct environmental impact patterns

however

- existing data allow a characterisation of industrial sectors beyond single score approaches
- the approach allows to identify impact patterns and to describe industrial sectors accordingly
- the relevance of different impacts to industrial sectors can be determined
- it is possible to identify the contribution of industrial sectors to a single potential impact
- this can also be analysed on the economic importance

# End

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