External costs from energy production in the Central and Eastern European countries

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Research Projects

European Commission

- **ExternE-Pol** „Externalities of Energy: Extension of accounting framework and policy applications“
- **IP NEEDS** „New Energy Externalities Developments for Sustainability“

Ministry of the Environment

- „External costs of electricity and heat production and methods of their internalisation“

External costs definition

An external cost arises, when the social or economic activities of one group of persons have an impact on another group and when that impact is not fully accounted, or compensated for, by the first group.

- physical change influences welfare or profit
- effect is not compensated
- effect is not caused through market (or prices), but directly

ExternE project series

Project ExternE = Externalities of ***E***nergy launched in 1991, financed by DG Research within the Joule programme

Scope

- airborne pollutants from power plants
- development of the Impact Pathway Approach

Follow-up projects

- improving and extending the methodology
- extending the field of applications: heat production, transport, industrial activities, agriculture

Aim of the ExternE methodology = helps to take into account all externalities in a consistent way when making decisions

- **Investment decision and technology assessment: comparison of energy technologies (subsidies, research support)**
  - **Fossil fuels**: coal and oil technologies with varying degrees of flue gas cleaning, natural gas, centralised systems and CHP
  - **Nuclear:** PWR, open and closed systems for fuel provision
  - **Renewable:** onshore and offshore wind, hydro, a wide range of biomass fuels (waste wood, short rotice, crops) and technologies
- **Internalising external costs – ‚getting the prices right‘**
  - Ecological taxes, subsidies
- **Cost-Benefit analyses, e. g. for measures and directives to protect the environment and human health**
  - Draft directive on non-hazardous waste incineration
  - Large combustion plant directive
  - EU strategy to combat acidification
  - Costs and benefits for the emission ceilings directive
  - Air quality limits for PAHs
  - Costs and benefits of acidification and ground level ozone
- **Sustainability and welfare indicator**
  - Adjustment of GDP

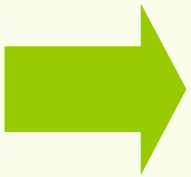
Basic principles

1. **Assessment of effects/damage (e.g. health risk), not of pressures (e.g. emissions of pollutants)**

3. **Relation between pressure and effect is in general non-linear**

5. **Effects depend:**

- **site of activity**
- **technology**
- **time**



Bottom-up approach needed for the complex pathways: the 'impact pathway approach'

- **preference structure of the population**

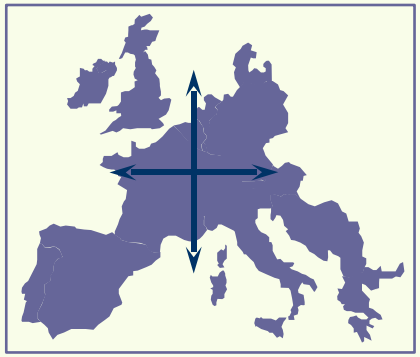
Valuation methods are used

e.g. contingent valuation method

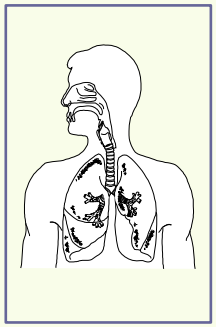
Impact pathway approach

POLLUTANT & NOISE EMISSIONS

TRANSPORT & CHEMICAL TRANSFORMATION



DIFFERENCES OF PHYSICAL IMPATS

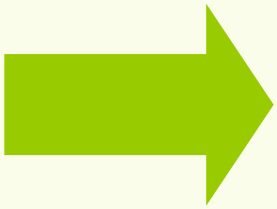


MONETARY VALUATION

Impacts included in the current ExternE projects

Pollutant/burden

- Particulate matters
- SO_2, NOx
- CO_2
- O_3
- Heavy metals
- CO, VOC
- Noise
- Odour



Impact category

- Human health
  - morbidity
  - mortality
- Building materials
- Crops
- Climate change
- Forests
- Natural ecosystems
- Visibility
- Cultural heritage

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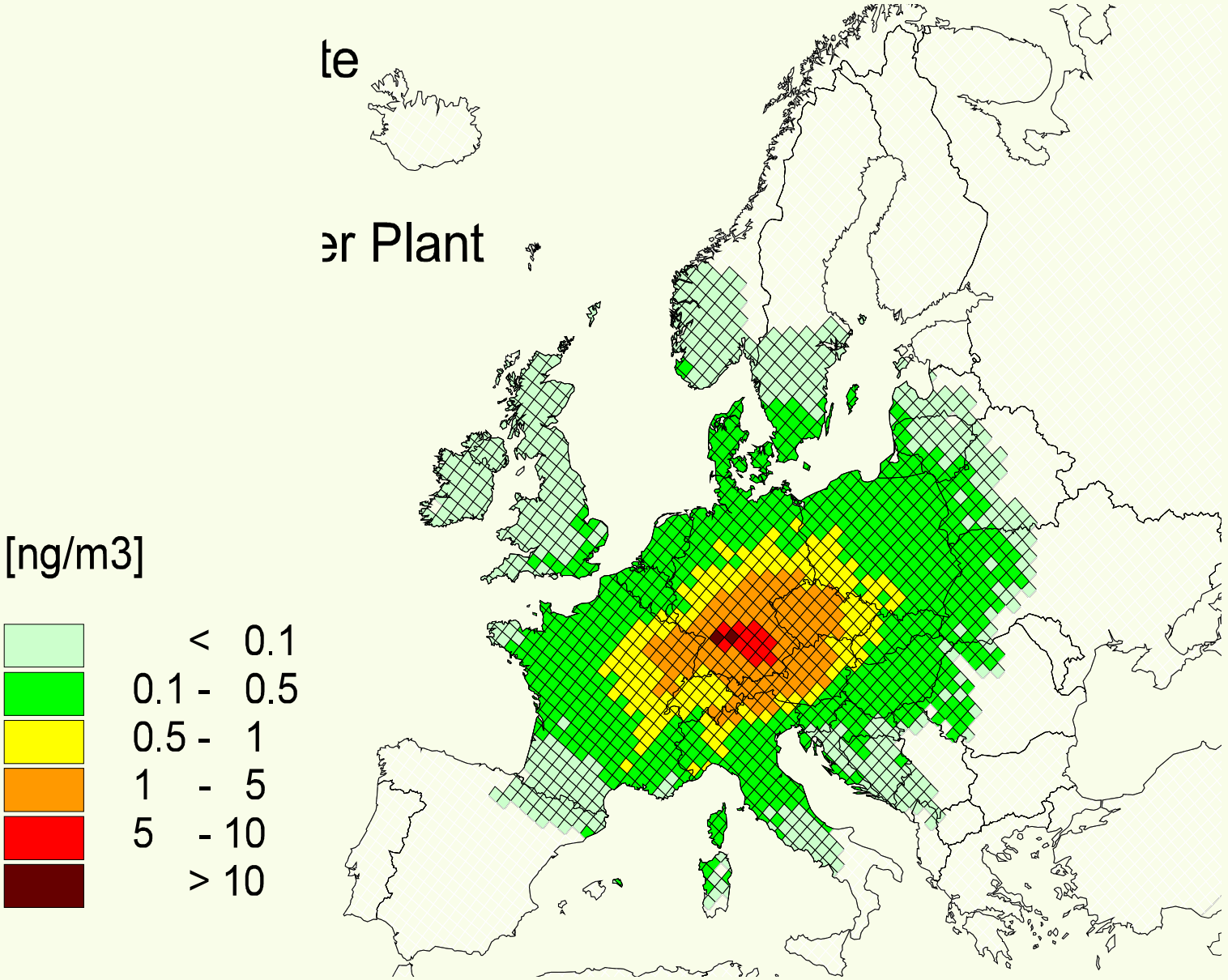
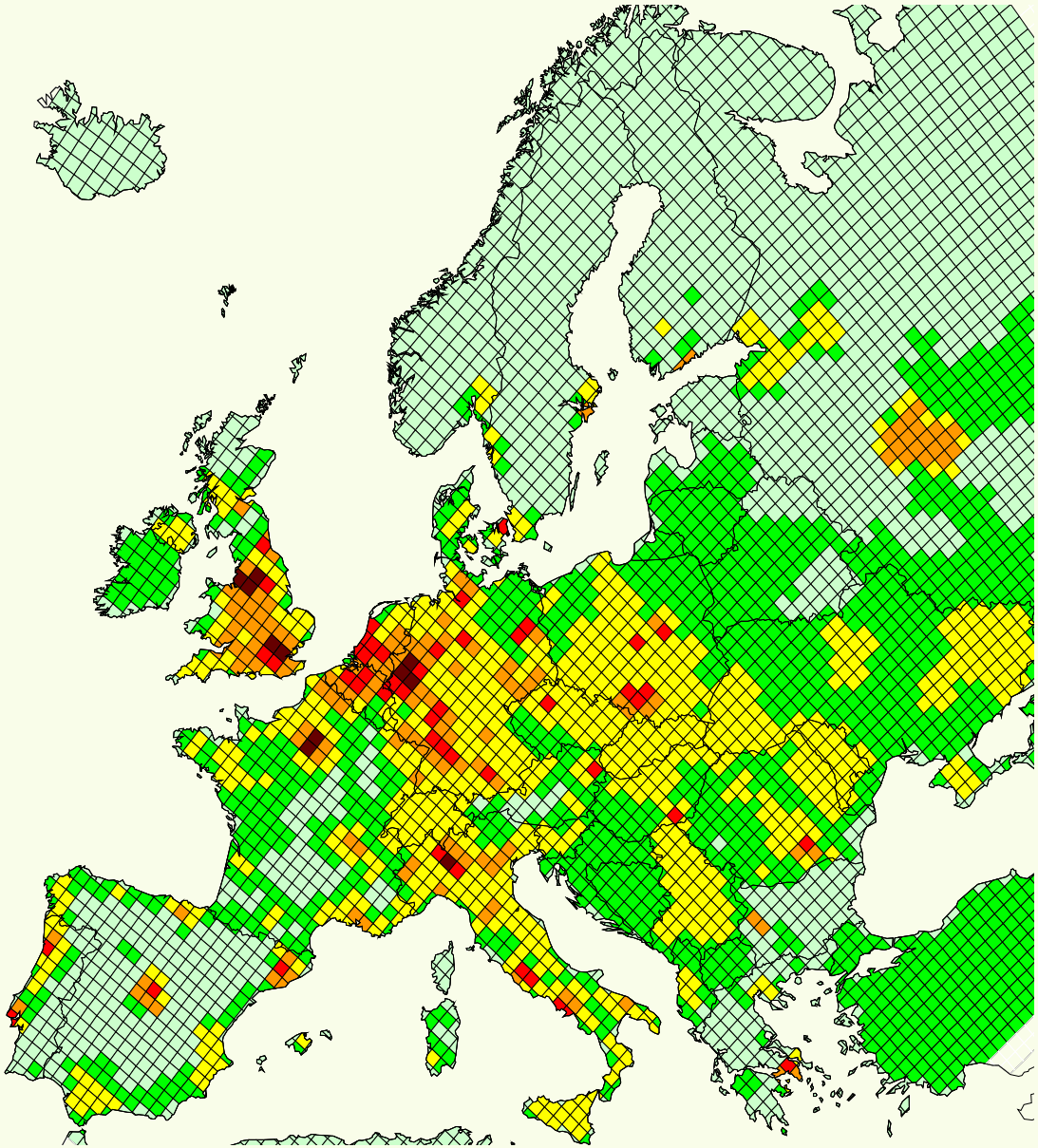


Source: IER



Source: IER

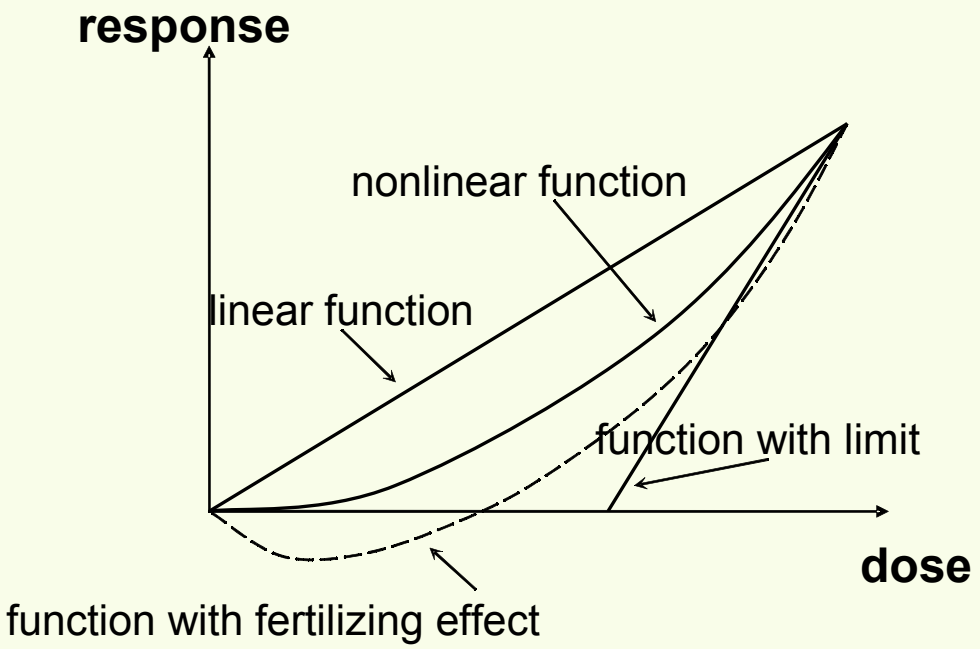
Quantification of impacts

Exposure Response Function:

Additional Years of Life Lost

$= 3.9 \cdot 10^{-5} \cdot \Delta Sulfate \cdot Population$

Quantified number of additional Years of Life Lost due to one year operation : 103



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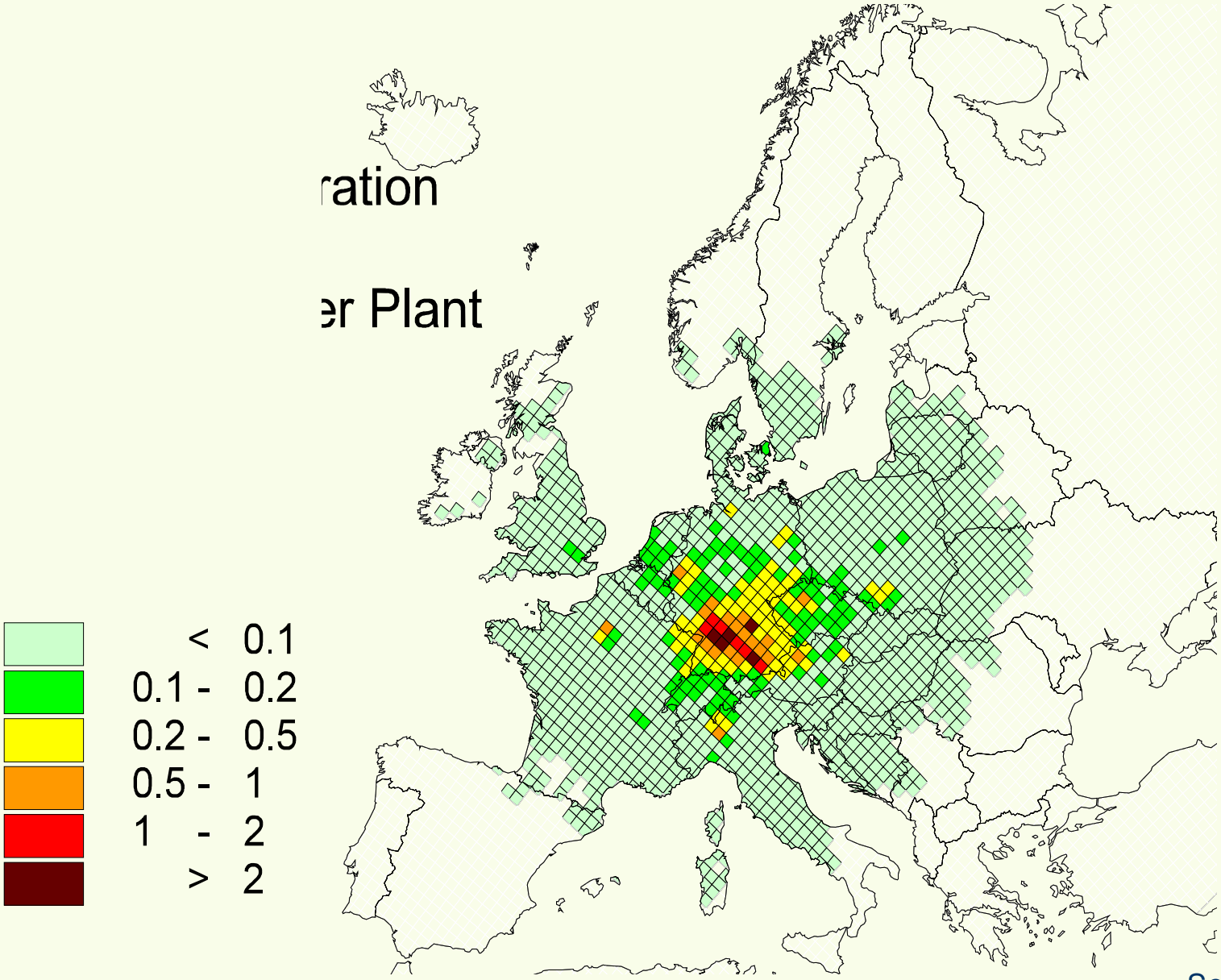


Source: IER

Monetary Valuation

Health end-point	Recommended central unit values in € price year 2000
Value of a prevented Fatality	1,000,000
Year of Life Lost	50,000 / year lost
Hospital admissions	2,000 / admission
Emergency Room Visit for respiratory illness	670 / visit
General Practicioner visits:	
Asthma	53 / consultation
Lower respiratory symptoms	75 / consultation
Respiratory symptoms in asthmatics:	
Adults	130 / event
Children	280 / event
Respiratory medication use – adults and children	1 / day
Restricted activity days	130 / day
Cough day	38 / day
Symptom day	38 / day
Work loss day	82 / day
Minor restricted activity day	38 / day
Chronic bronchitis	190,000 / case

Assessment of greenhouse gas emissions in the EU

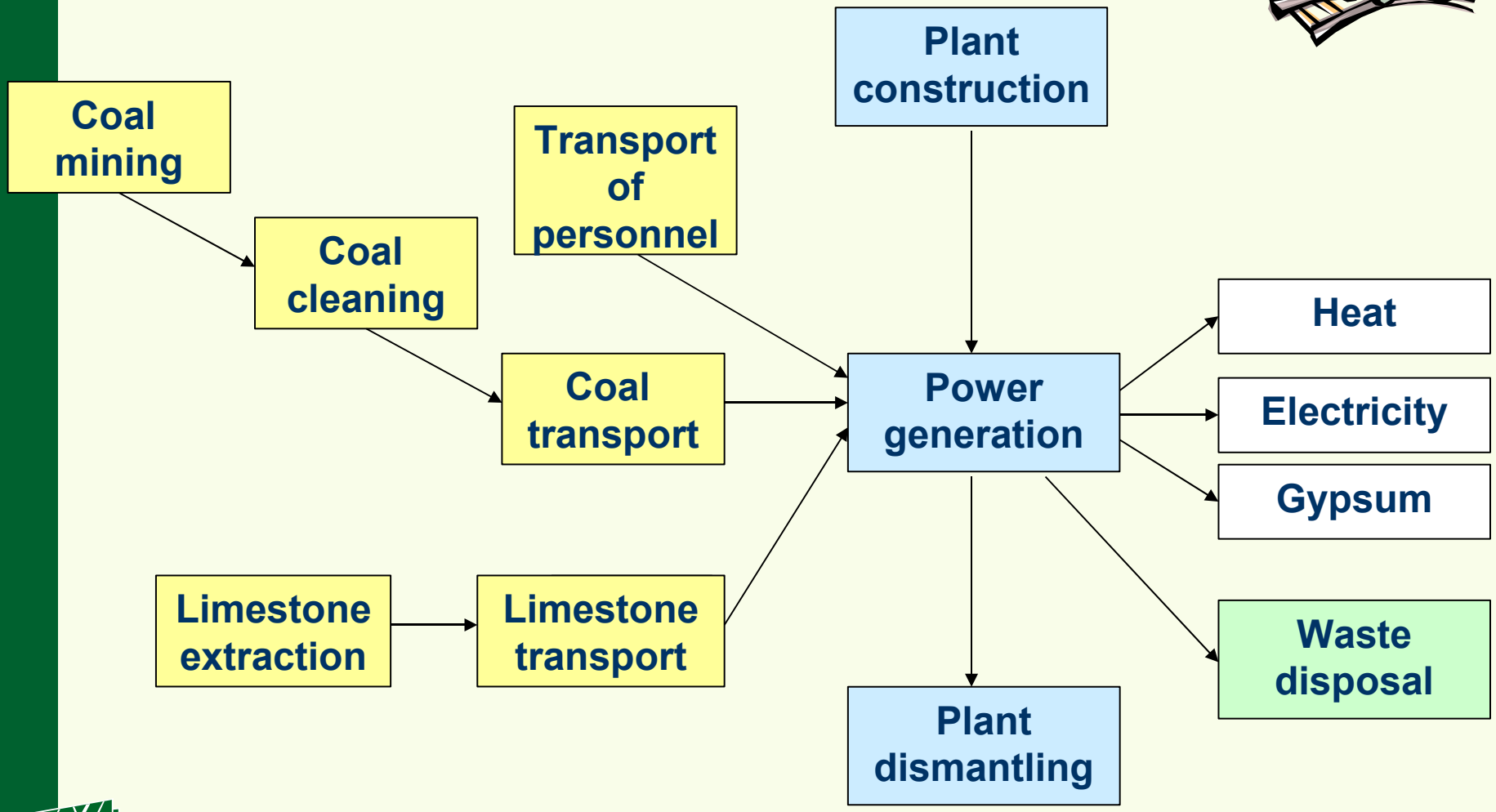
Marginal damage costs:

- 2,4 $€_{2000}$ per t CO_2 (ExternE 2000) – median value
- large range ca. 0,1 to 16 € per t of CO_2 in ExternE
- up to 165 € per t of CO_2 in other studies

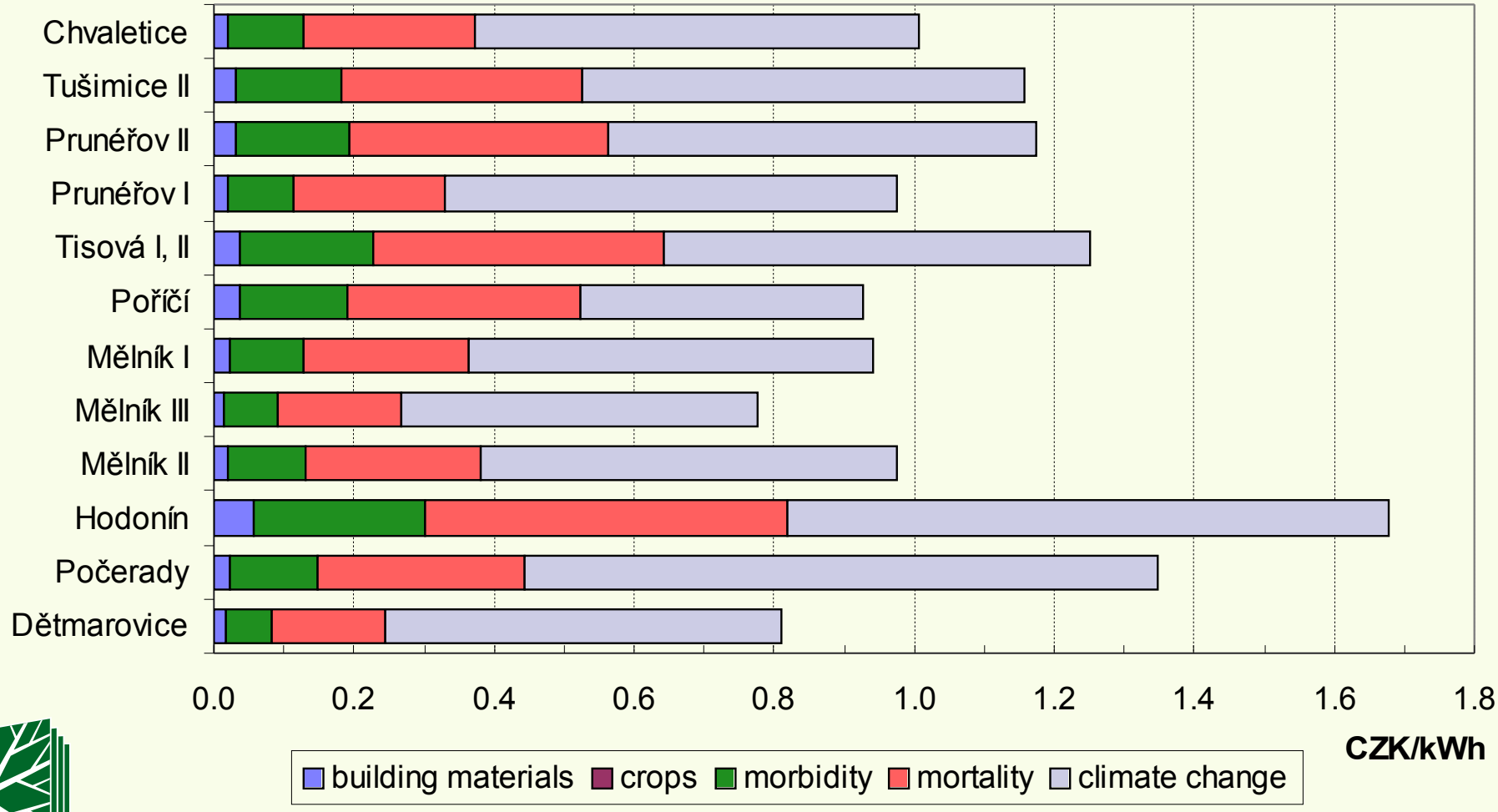
Marginal avoidance costs:

- 19 € for EU-Kyoto aim -8% $CO_{2eq.}$ 2008-2012 compared to 1990
- ca 20 € per t $CO_{2eq.}$ with emission trading

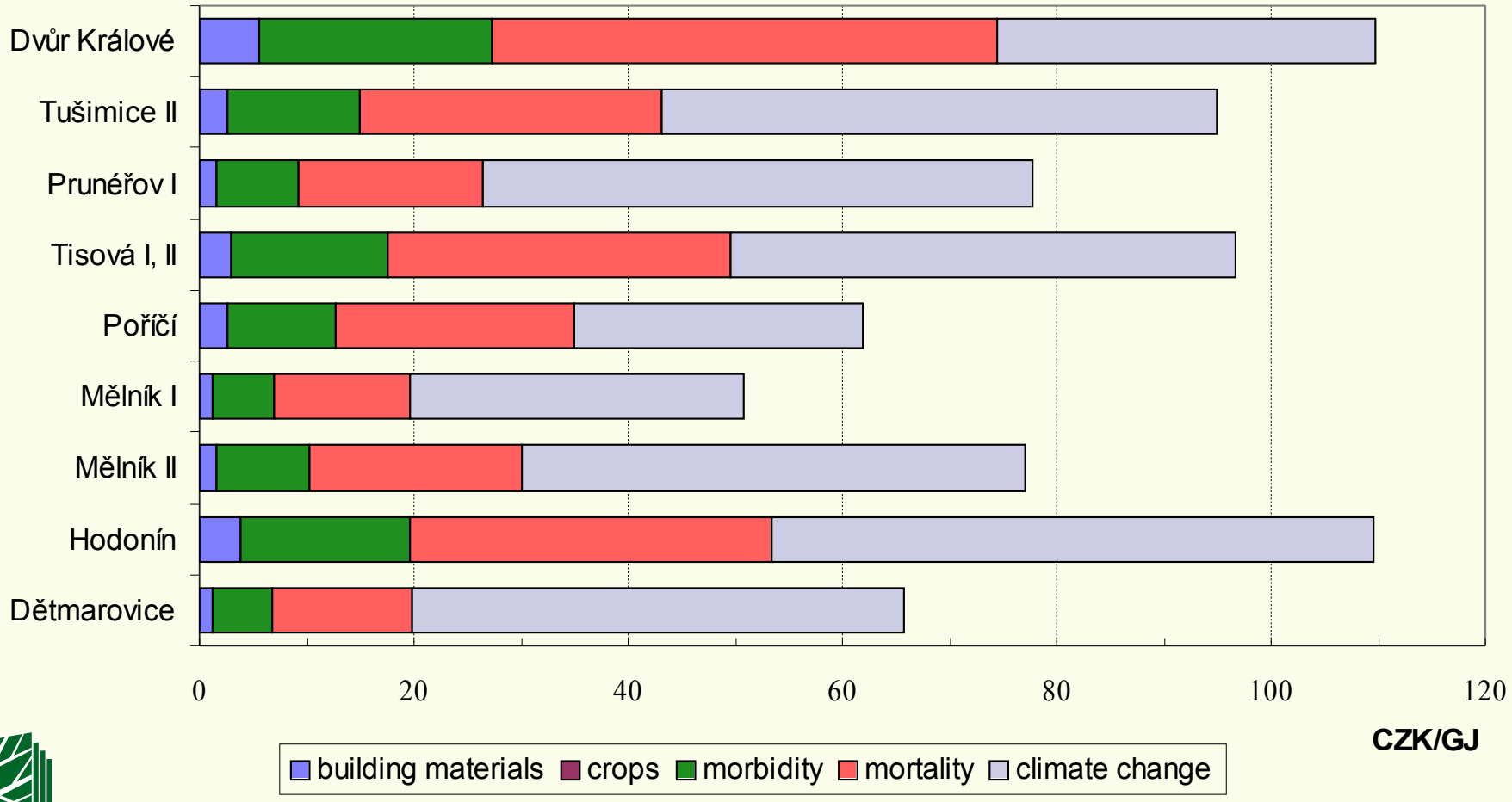
Coal fuel cycle



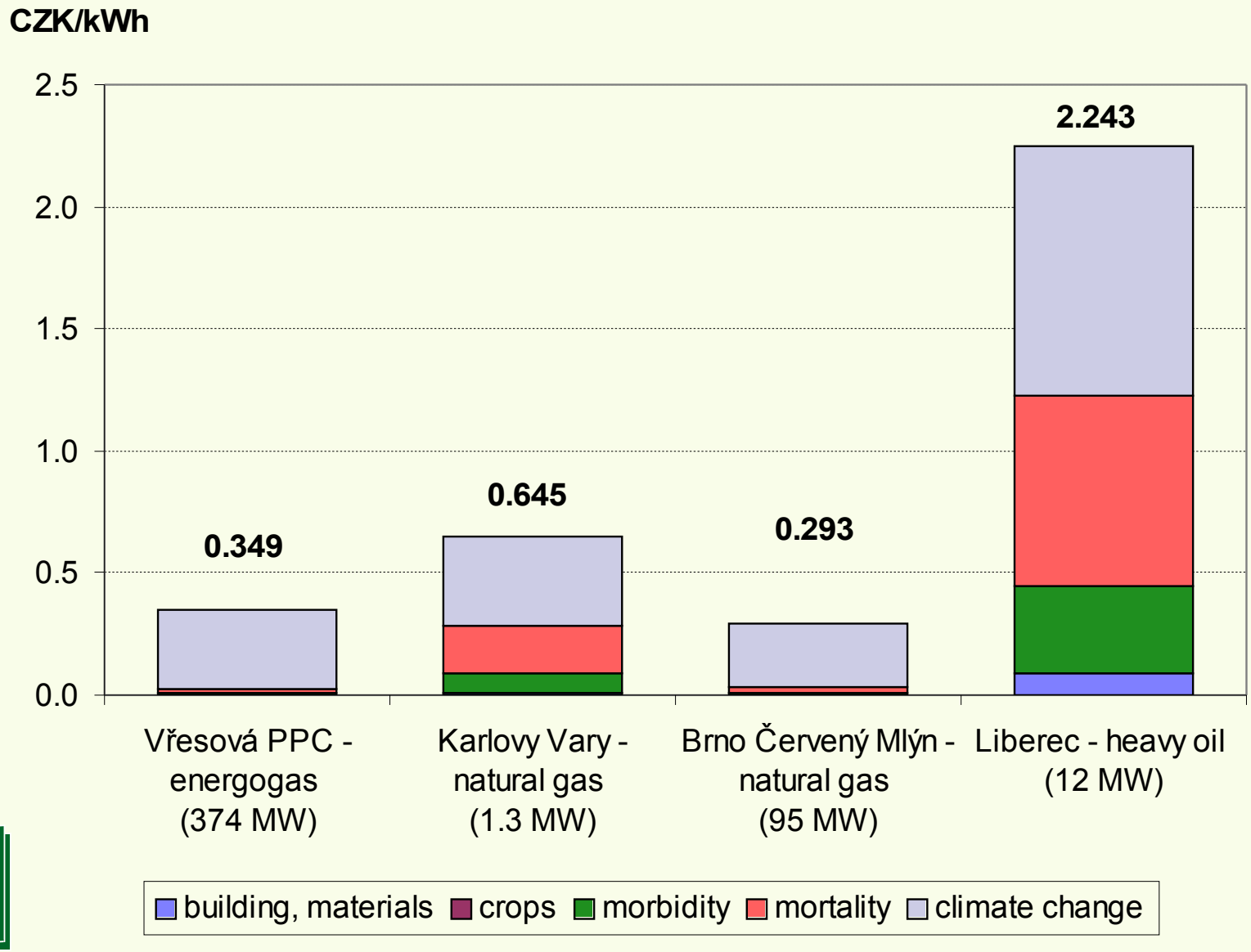
External costs from electricity production in 2003 (CZK/kWh) – coal fuel cycles



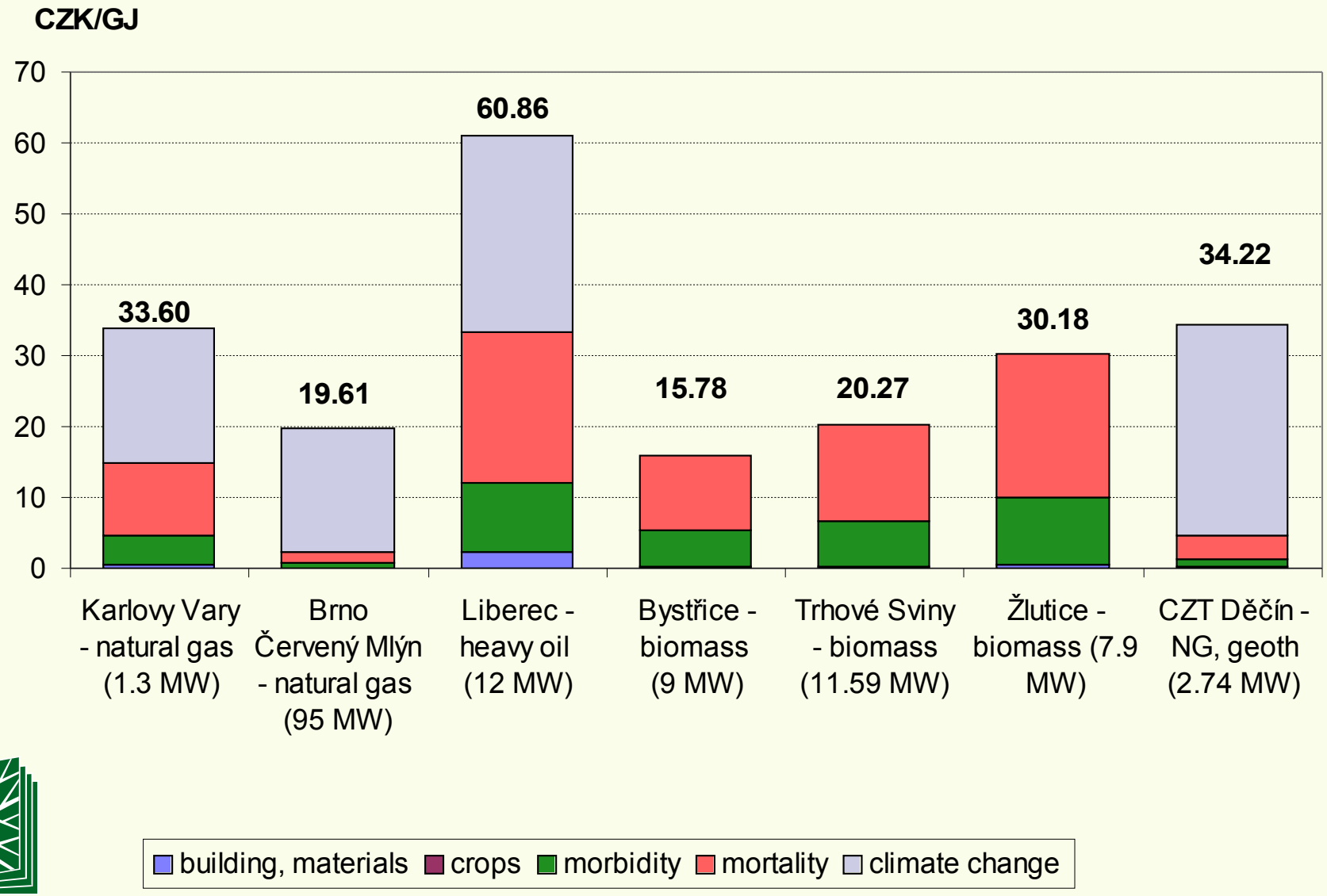
External costs from heat production in 2003 (CZK/GJ) – coal fuel cycles



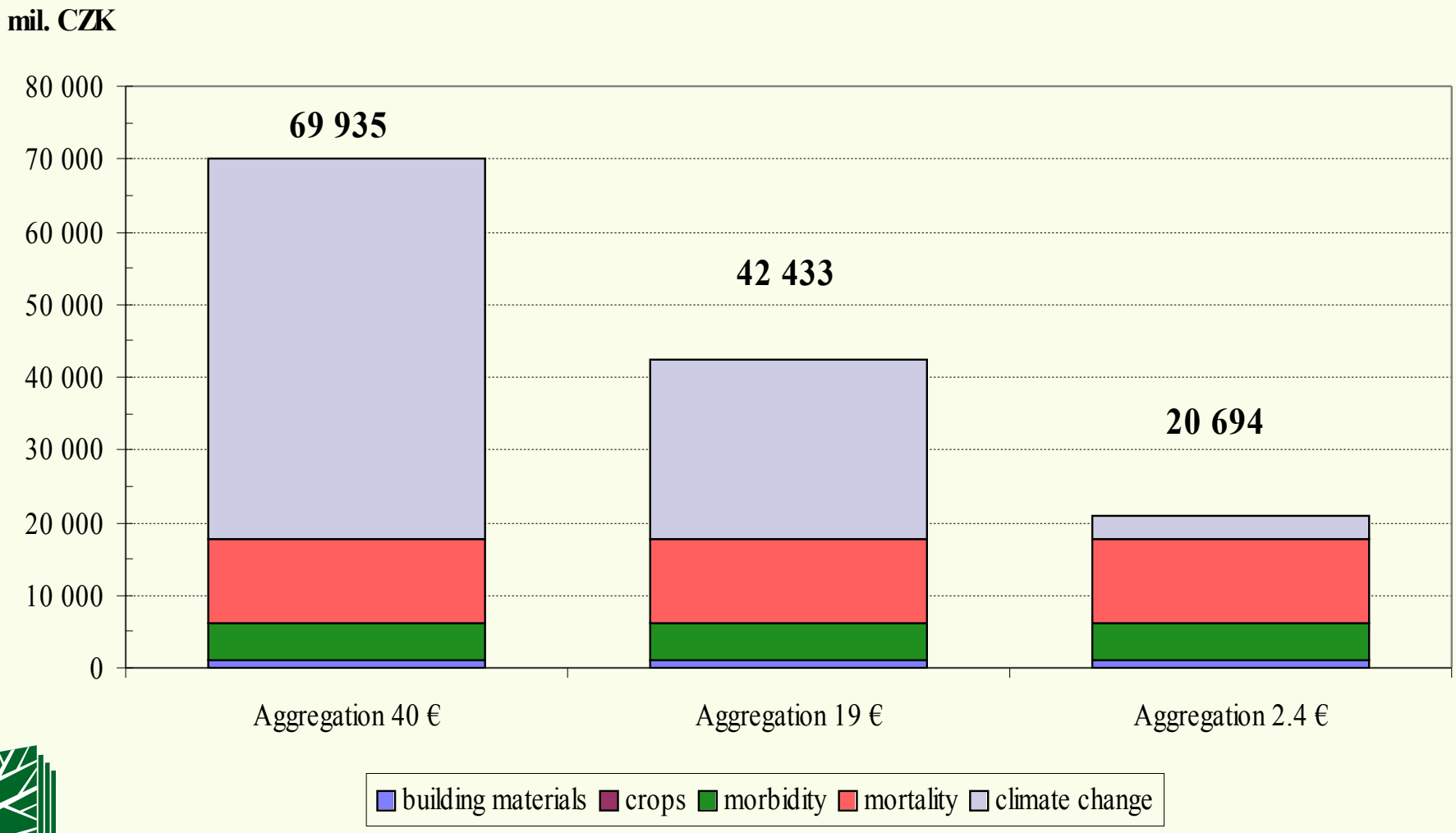
External costs from electricity production in 2003 (CZK/kWh) – gas and oil fuel cycles



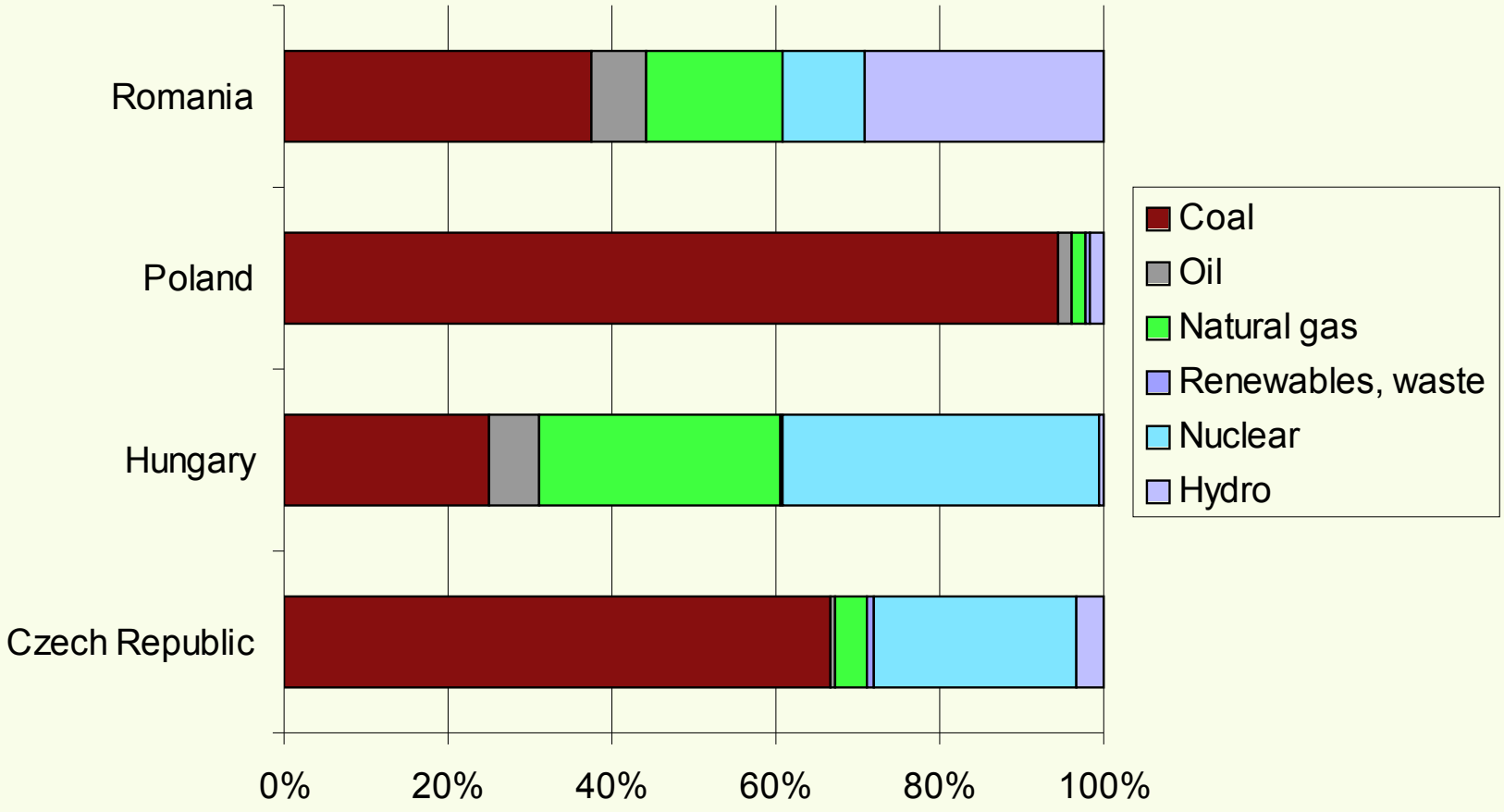
External costs from heat production in 2003 (CZK/GJ) – gas and biomass fuel cycles



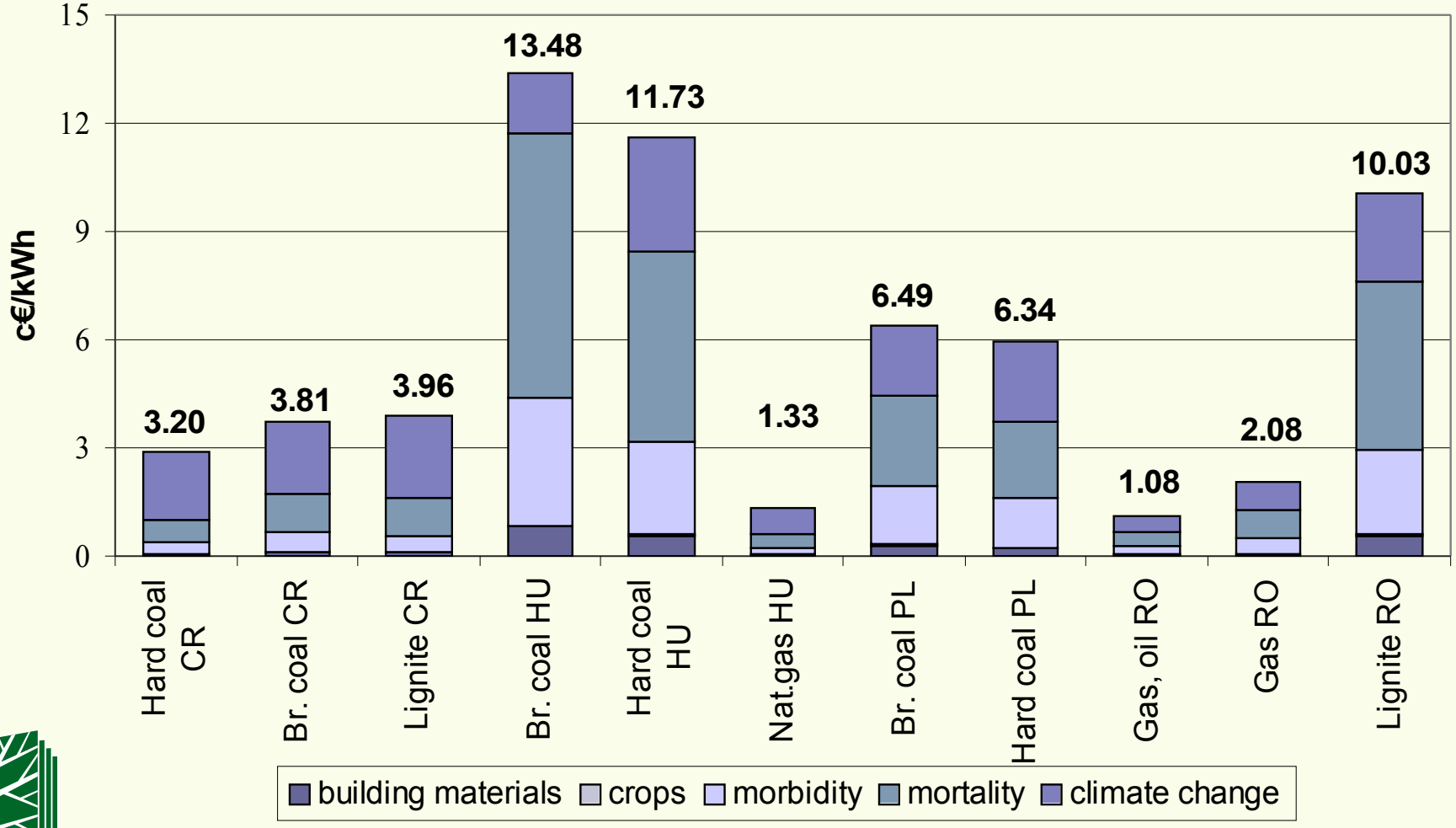
Aggregation of external costs from 14 Czech coal power plant (2003) - heat & electricity



The share of electricity generation by source in selected CEEC (2002)



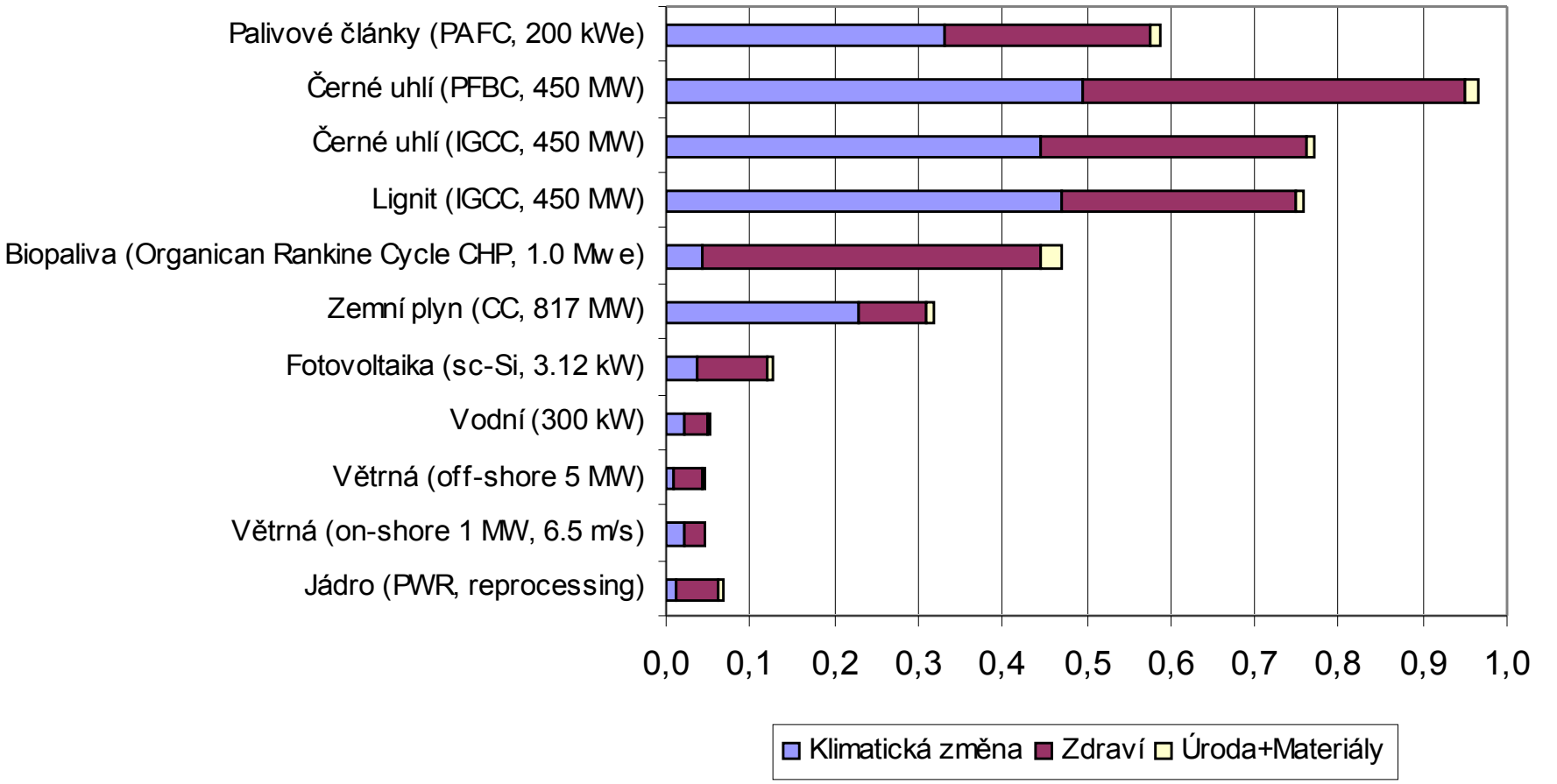
External costs from electricity production in the CEEC 2002 (c€/kWh) – coal, gas and oil fuel cycles



External costs for new energy technologies (CZK/kWh)

Identification of energy source

- Current technologies *(ex post* analysis*)*
- Modern and future and technologies (*ex ante* analysis)



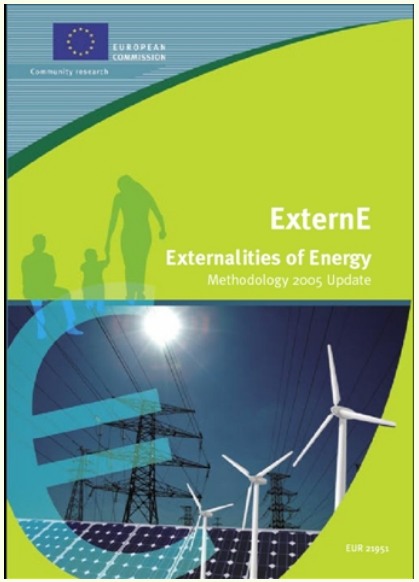
Source: IER

Information for you

ExternE website ⇒ www.externe.info

You can download there:

- ExternE methodology 95
- National Implementation
- Final reports of ExternE projects
- Information brochure on external costs (2003)



You can also find there:

- Description of ExternE projects
- Numerous applications
- Improved computer tools available (RiskPoll, EcoSenseLE)

Thank you for

your attention

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