

## External costs and their integration in energy costs

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- EU research effort
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## NEWS

- A Workshop on this subject has been held in Brussels on 9 December 2005 with various scientists and DG representatives. See [WWW.EXTERNE.INFO](http://WWW.EXTERNE.INFO)
- A new ExternE Methodology 2005 update
- A new ExternE Results 2005 update  
*To be published soon*

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## EXTERNAL COSTS

- Externalities are changes of welfare generated by a given activity without being reflected in the market prices
- Energy externalities (like transport, industrial or agricultural externalities) are often negative and considered as a cost which is external because it is not paid by those who have generated it
- A clear example of externality is the air pollution which increases hospital admissions for respiratory illness (pain and suffering, costs of healthcare, lost productivity)

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## EXTERNAL COSTS

- If “internalised”, external costs can help to move towards a more sustainable energy (or transport, industrial or agricultural) system
- If not internalised and taking into consideration public goods (like air or soil or water quality) there is a sort of distortion of the market favouring non sustainable technologies
- Alternative technology options can become competitive through the internalisation of external costs

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## EUROPEAN RESEARCH EFFORT

- Energy externalities : a terminology entered in the European “jargon” and applicable to various policies: environment, energy, transport, taxation and state aid.
- A new way of thinking: taking care of social and environmental damages (“polluter pays” principle)
- Major advances in both research on energy externalities quantification and on policy implementation these last 15 years

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## EUROPEAN RESEARCH EFFORT

- Influence of SD and of public / social actions on the internalisation of energy externalities
- From the beginning of the 90's: close to 15 M € dedicated to research on energy externalities
- Scientific support to European policies
- EU reference at the world-level
- Multidisciplinary research consortium
- Genuine European methodology and approach




## EUROPEAN RESEARCH EFFORT

- Verband der Elektrizitätswerke Österreichs (AT)
- Vlaamse Instelling voor Technologisch Onderzoek – VITO (BE)
- IER, Universität Stuttgart (DE)
- Risoe National Laboratory (DK)
- Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas – CIEMAT (ES)
- National Technical University of Athens – NTUA (EL)
- Ecole des Mines de Paris - ARMINES (FR)
- EKONO Energy Ltd. (FIN)
- Technical Research Centre of Finland – VTT (FIN)
- Fondazione Eni Enrico Mattei (IT)
- Istituto di Economia delle Fonti di Energia – IEFE (IT)
- Energy Conversion Centre, University College Dublin (IRL)
- Vrije Universiteit Amsterdam – IVM (NL)
- ENCO Environmental Consultants (NO)
- Centro de Estudos em Economia da Energia, dos Transportes e do Ambiente (PT)
- Stockholm Environmental Institute (SE)
- AEA Technology plc (UK)



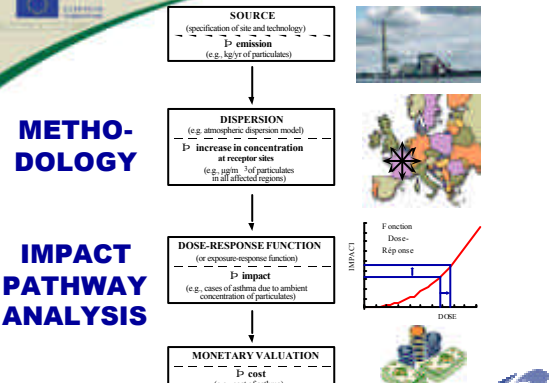
## METHODOLOGY


- Quantification of impacts through the damage function or impact pathway approach
- Economic valuation obtained by the willingness to pay by the affected individual to avoid a negative impact
- Bottom-up methodology (technology characterisation) with a site-specific approach
- Comparison between different fuel-cycles and different types of burden and impact with a fuel-cycle



## METHODOLOGY

### IMPACT PATHWAY ANALYSIS






## METHODOLOGY

### 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 Practitioner 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




## EU POLICIES

### ENVIRONMENT


- To limit values for sulfur dioxide, nitrous oxides, particles and lead in the atmosphere
- To struggle climate change
- To combat acidification and eutrophication
- CAFE: Clean Air for Europe
- Communication on the Sixth EAP of the European Community - "Environment 2010: our future, our choice" - COM(2001)31

*"To ensure that those who cause injury to human health or cause damage to the environment are held responsible for their actions"*




### EU POLICIES ENERGY

- Green paper: *Towards a European strategy for the security of energy supply* - COM(2000)769  
*"Fiscal instrument (...) should lead to the internalisation of damage caused to the environment"*
- Green paper: *A European Strategy for Sustainable, Competitive and Secure Energy* - COM(2006)105  
*"The Community needs a real Community-wide debate on the different energy sources, including costs and contributions to climate change"*
- Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market - OJ L 283  
*"Need to internalise external costs of electricity generation"*




### EU POLICIES TRANSPORT

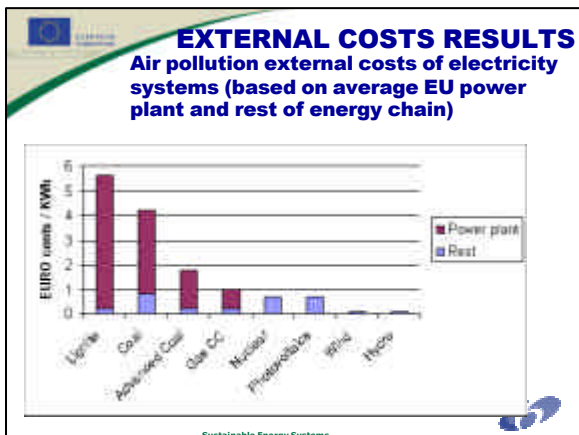
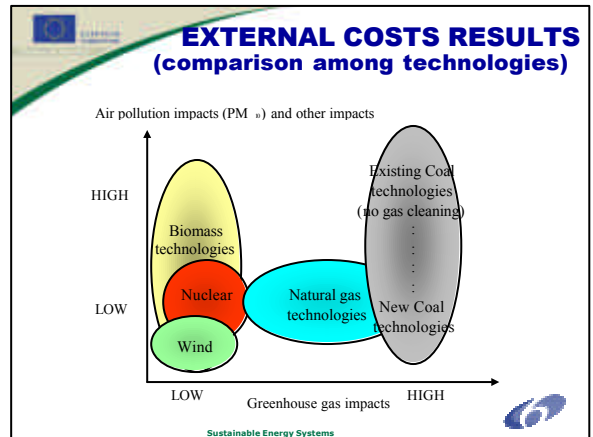
- White paper- *European transport policy for 2010: time to decide* - COM(2001)370  
*"Towards modal rebalance and greater internalisation of external costs"*
- Proposal for a Directive on *the charging of heavy goods vehicles for the use of certain infrastructures* - COM(2003)448  
*"Charging for infrastructure use (...) is intended to provide positive economic incentives for transport operations through a structure which more effectively integrates external costs and infrastructure costs in transport prices"*



### EU POLICIES STATE AID


- Community guidelines on state aid for environmental protection - OJ C 37 (2001)  
*"The principle of prices to reflect cost states that the prices of goods or services should incorporate the external costs"*
- "Member States may grant operating aid to new plants that will be calculated on the basis of the external costs avoided (...)*  
*The amount of the aid thus granted to the renewable energy producer must not exceed 5 eurocents/kWh"*





### DAMAGES OF AIR POLLUTANTS IN THE EU (€/tonne) - CAFE

NOx	SO <sub>2</sub>	PM <sub>2.5</sub>	VOC	NH <sub>3</sub>
4,200 - 11,000	5,400 - 16,000	25,000 - 72,000	920 - 2,700	10,000 - 30,000



## FP6 (2002-2006) SUSTAINABLE ENERGY SYSTEMS

**Medium and long term energy research actions**

- Fuel cells, including their applications
- New technologies for energy carriers, particularly H<sub>2</sub>
- New and advanced concepts in renewable energy technologies
- Capture and sequestration of CO<sub>2</sub>
- *Socio-economic tools and concepts for energy strategy*
- *Policy-orientated research*

## FP7 (2007-2013) COOPERATION - ENERGY

Hydrogen and fuel cells	Energy savings and energy efficiency
Renewable electricity generation	CO2 capture and storage technologies for zero emission power generation
Renewable fuel production	Clean coal technologies
Renewables for heating and cooling	Smart energy networks
<b>Knowledge for energy policy making</b>	

## CURRENT EUROPEAN RESEARCH TOPICS

- To define a methodology for ecosystem damages
- Effects from multi-media (air/water/soil) impact pathways
- Externalities from major accidents (cf. oil tankers)
- To evaluate fuel cycles in all Europe
- To pursue a stakeholder dialogue
- To assess new and emerging new technologies
- To address energy security of supply issues
- To evaluate long-term internalisation strategies

## QUESTIONS


- What should be included in the “external costs” definition (security of supply, depreciation of infrastructure publicly funded, acidification, nuclear proliferation...)?
- Are there sufficient bottom-up studies (to cope with time and site variability) for each technology?
- Generalisation and transferability?
- How to pass the costs on to the users in a socially and politically acceptable way?
- Taxation or subsidy?
- How to use the money recovered from the internalisation of external costs?

## QUESTIONS


- Political context and externalities (cf. nuclear and renewables)?
- National, EU or global « internalisation » (cf. competitiveness)?
- External costs vs. Subsidies (energy or social ones)?
- Communicate the uncertainties?
- Preference of the population with respect to different types of risks?
- Potential of technological progress?

## CONCLUSIONS

- Are we ready to accept a reduction of the average life expectancy of the European population of around 5 months due to air pollution?
- Health impacts of air pollution from electricity and transport sectors are around 80 billions €, i.e. approximately equivalent to the EU budget (100 billions €)
- Internalising external cost of coal electricity would significantly increase its cost

 **CONCLUSIONS**

- If “internalised”, external costs can help to move towards a more sustainable energy (or transport, industrial or agricultural) system
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 **INFORMATION AND SOURCES**

- <http://www.externe.info/>
- [http://europa.eu.int/comm/research/energy/pdf/externe\\_en.pdf](http://europa.eu.int/comm/research/energy/pdf/externe_en.pdf)
- **Contacts: European Commission and EU RTD projects coordinators (IER, ARMINES, ISIS, University of Bath)**

  
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