

Extending the external costs framework

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External costs of energy and their internalisation in Europe
Dialogue with industry, NGO, and policy-makers

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Giving the right price to energy production

External costs

Internal or private costs



Focus on EU 25, Bulgaria, Turkey, China, Brazil, India



NEEDS-IP and CASES-CA

Internal or private costs of energy production

- All technology and plant specific cost components:
 - investment
 - operation and maintenance
 - fuel costs as well
 - costs related to pollution control
 - waste management
 - other health and environmental protection measures
- *Technologies differ* in their technical characteristics and their economic indices from country to country and over time.

External costs (I)

Update impacts of:

- **Acidification**
 - on freshwater fish
- **Acidifying compounds**
 - (SO_2 , NO_x and NH_3) on terrestrial ecosystems, including agriculture
- **Eutrophication**
 - on drinking water, boating, swimming, recreational fishing
- **Visual intrusion**
 - landscape aesthetics of renewable energy (wind and hydro) and eutrophication.

External costs (II)

- **Energy security**

assessment of policy options to reduce - and insure against - the costs of energy insecurity

- **Damocles risk**

risk where the possible damage can be very high, but the probability that it occurs is very low

– mega-dams or nuclear power plants.

- **Risk aversion**

External Costs (III)

- Systematization of costs.
 - There are many estimates around but they are not all comparable
- Forecasting of external costs
 - How will external costs change as demand for energy changes, as energy flows change and as environmental controls get stricter?
- CASES looks at these issues
- Other issues relate to possible external costs of social disruption (e.g. unemployment, alienation)

How to internalize external costs?

- Different policy instruments, either to increase the costs of producing fossil fuel based energy or to promote the production of renewable energy
- What social and fiscal implications will such measures have, especially on poor and vulnerable groups?
 - Employment, energy prices, etc.
- What impact will different policies have on the use of different types of energy?
- How acceptable are these instruments to the public?

Methodologies for the evaluation of the external costs

- Monetary valuation through Cost-Benefit Analysis based on the preferences of the **population** affected by the external costs:
 - Revealed preferences (travel cost method, hedonic pricing method)
 - Stated preferences (contingent valuation, choice experiments)
- Cost Effectiveness Analysis
- Multi Criteria Decision Analysis
 - involvement of **stakeholders**

Example: Results from a *Choice Experiments* study (Markandya et al, 2005)

- Goal: valuing the **effects** on (i) human health and the environment, (ii) energy security, (iii) employment sector of a policy for the promotion of renewable energy
- Methodology: choice experiments (CE)
 - CE ask individuals to choose between two or more hypothetical “commodities” (policies) described by a vector of attributes.
 - The levels of the attributes are varied across the policies, so that respondents trade them off, and one of them is usually a cost amount, which allows the computation of marginal prices of the attributes.

Example of choice experiment (Markandya et al, 2005)

| Attributes of the policies | Policy A | Policy B | Neither (Status quo) |
|-----------------------------------|--------------------------|--------------------------|--|
| Greenhouse Gases emissions | 2% reduction per year | 1% reduction per year | no additional greenhouse gases emissions reduction |
| Black-outs | 30 min per year | 60 min per year | current level of black-outs |
| Employment | 0 new jobs | 1,000 jobs | no employment change in the energy sector |
| Price | £16 per quarter | £6.5 per quarter | no price increase in the electricity bill |
| Which policy would you choose? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Results from Markandya et al, 2005

- 300 in person interviews of residents of Bath
- Respondents are willing to pay for the following effects brought by a policy that promotes renewable energy (£/per quarter):
- £29 to decrease GHG emissions by 1% a year
- £3.60 to decrease energy shortages by 10 minutes a year
- £2.00 to increase by 1,000 the number of permanent jobs in the energy sector.

Conclusions

- 15 years of ExternE have shed light on the external costs of energy production
- Stakeholders are more aware and accepting of the external costs framework
- ExternE methodology has also been applied to other areas (e.g. land use)
- The external costs framework is still improving:
 - Criteria for evaluation
 - Treatment of uncertainty
 - Internalization of the external costs
 - Discussion with stakeholders