Accounting for externalities

April 21, 2004

For any regulatory issue, four types of questions must be resolved:
Success Criteria for Regulatory Intervention

Success criteria for regulatory intervention

- Improvement
- Equity
- Efficiency
Definition of external costs

“Fuel cycle externalities are the costs imposed on society and the environment that are not accounted for by the producers and consumers of energy, i.e. that are not included in the market price. They include damage to the natural and built environment, such as effects of air pollution on health, buildings, crops, forests and global warming; occupational disease and accidents; and reduced amenity from visual intrusion of plant or emissions of noise. Traditional economic assessment of fuel cycles has tended to ignore these effects.”

-- European Commission

Failure to take account of external costs will result in excessive pollution

![Graph showing supply and demand curves with price and quantity axes.](image)
• The effect of regulation is to internalize
  – Mandatory controls on technology
  – Mandatory emissions limits
• But regulations do not eliminate external costs
• In principle, want to minimize total social cost (= internal cost + residual external cost)
• In practice, external costs haven’t been considered until recently
• Now there are attempts to do so
  – Resource/technology selection decisions
  – Emissions taxes
  – Subsidies of renewables on the basis of avoided external costs

**Representative Externality Assessment Inputs**

Units are Dollars Per Metric Ton

<table>
<thead>
<tr>
<th>Emissions</th>
<th>NY PSC</th>
<th>MA DPU</th>
<th>NV PSC</th>
<th>CA PU</th>
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<tr>
<td>SO$_2$</td>
<td>900</td>
<td>1650</td>
<td>1720</td>
<td>4500</td>
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<td>NOx</td>
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<td>7170</td>
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<td>7800</td>
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<td>3600</td>
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<tr>
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<td>950</td>
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<td>-</td>
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<tr>
<td>N$_2$O</td>
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<td>4400</td>
<td>4600</td>
<td>-</td>
</tr>
</tbody>
</table>

The differences in part reflect differences in the size of the affected populations in the different countries.

Source: European Commission, ExternE Project, http://externe.jrc.es/All-EU+Summary.htm

Note: The differences in part reflect differences in the size of the affected populations in the different countries.
Environmentally Related Damage Costs for Selected Electricity Supply Technologies (excluding global warming)

stated external environmental cost (bars represent range over a variety of studies)

1995 c/kWh

on logarithmic scale

- Onshore wind
- Photovoltaics
- Biomass
- Hydroelectricity
- Nuclear fission
- Gas
- Oil
- Coal

Range of Externality Study Estimates (including global warming)
from Ref. S-3