Health-related social costs due to residential heating and cooking

31 March 2022, Marisa Korteland
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CE Delft

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Clients

- Industries (Small and medium size enterprises, transport, energy and trade associations)
- Governments (European Commission, European Parliament, regional and local governments)
- NGOs
Introduction

- Cooking and heating cause air pollution = damage to human health
- No ‘financial value’ attached means not considered by policy makers
- Value the adverse health impact to society: social cost approach
- Loss in economic welfare:
  - direct (health care) expenditures: hospital admissions, loss of working days
  - indirect health impacts and accompanied welfare loss: discomfort of diseases, increased mortality risk/reduced life expectancy.
- Social costs differ per country (income level, population density etc.)
Methodology

• Health-related costs to society:
  - 7 pollutants: PM$_{2.5}$, NO$_X$, NH$_3$, SO$_2$, CO, CH$_4$ and NMVOCs
  - Direct pollution at home, indirect pollution at electricity and heat generation production plants
  - EU27+UK, Spain, Italy, UK and Poland
  - Total cost estimates (€/year): total annual emissions * social cost estimates per emission
Methodology

- Costs per fuel-technique combination:
  ◦ contribution to total cost figures (% of total)
  ◦ euro/GJ delivered: emissions factors * social cost estimates per emission. To add context: translated into annual costs per (average) household

- Expected impact of switching to alternative fuel-technique options
Main results: total costs to society

- Total health-related social costs of residential heating and cooking in EU27+UK: €29 billion or 0.2% of GDP (2018)
  - €27 billion: direct pollution due to combustion at home
  - €2 billion: indirect pollution at electricity/heat production sites

<table>
<thead>
<tr>
<th>Country/region</th>
<th>Total health-related costs to society (billion €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU27+UK</td>
<td>29</td>
</tr>
<tr>
<td>Poland</td>
<td>3.3</td>
</tr>
<tr>
<td>Italy</td>
<td>4.7</td>
</tr>
<tr>
<td>Spain</td>
<td>1.2</td>
</tr>
<tr>
<td>UK</td>
<td>2.7</td>
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</tbody>
</table>
Main results: differentiation

- Contributors to total health-related social costs in the EU27+UK:
  - wood stoves (41%)
  - coal boilers (17%)

- National results illustrate this:
  - coal boilers dominant in Poland
  - wood-based techniques in Italy, Spain and UK
Main results: per fuel-technique combination

• Costs to society per fuel-technique (annual €/hh):
  - coal boiler: € 1,200
  - wood stove: € 750
  - gas boilers: € 30
  - heat pumps: € 10

• Costs can be reduced by:
  - alternative fuel-technique combinations
  - greener electricity and heat production

• To compare: rough and indicative estimate of annual social costs diesel car: € 210
Main results: alternative heating options

Alternative options (EU27+UK)

- Green hydrogen boiler: €108.1 (current costs), €9.3 (potential costs)
- Grey hydrogen boiler: €13.3 (current costs), €13.3 (potential costs)
- Heat pump: €8.7 (current costs), €0.0 (potential costs)
- Hybrid heat pump: €12.0 (current costs), €5.1 (potential costs)
Further research

- Underestimation of health-related social costs: based on outdoor pollution only
- Indoor pollution:
  - impact depends on many factors (ventilation, space, time spend indoor)
  - method and data needed for quantifying additional impact

→ further research needed
Questions?

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