Sector wide impacts modelling

Some examples

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EU Climate policy is strongly informed by the use of modelling tools (prices, costs, benefits, distributional impacts, etc.)

But modelling tools do not determine policy outcome, e.g. targets for 27 Member States are not defined using a model optimisation

One single model cannot address everything.

 Requires set of models
How to maintain a coherent modelling framework?

- **Examples of tools used that can meet these requirements, some examples:**
  - GHG profiles at global level and associated direct costs to reduce them: **POLES, IMAGE-TIMER**
  - GHG profiles at EU level and associated direct costs to reduce them: **PRIMES - GAINS**
  - Macro economic impacts including employment effects: **GEM-E3 (EU model version), E3MG, PACE**
  - Competitiveness impacts: **GEM-E3 (global model version), E3MG and PACE**
  - Impacts adaptation: **GEM-E3 (EU version) linked to climate impact models**
  - Interaction with other air pollutants: **GAINS linked to PRIMES or POLES**
  - Agriculture, Land Use, Land Use Change and Forestry: **CAPRI, DIMA, G4M, GLOBIOM, EUFASOM, etc.**
  - Sector specific impacts, e.g. transport: **TRANSTOOLS, TREMOVE**
The EU modelling set-up: PRIMES (+GAINS)

- Combination of interlinked models
  - Core: PRIMES energy system model
  - And: GAINS non-CO2 emission model

PRIMES: one of the 2 models originally used in 2000 to study how the ETS could reduce costs in the EU

http://ec.europa.eu/environment/enveco/climate_change/climate_change.htm
Example 2050 Roadmap

Modelling emissions and sectoral efforts, investments and savings, costs
80% domestic reduction in 2050 is feasible:
- with currently available technologies,
- with behavioural change only induced through prices,
- If all economic sectors contribute to a varying degree & pace.

Efficient pathway:
MILESTONES
- 25% in 2020
- 40% in 2030
- 60% in 2040
Cost efficient milestones: ETS and non-ETS sectors

<table>
<thead>
<tr>
<th>Reductions compared to 2005</th>
<th>2030</th>
<th>2050</th>
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</thead>
<tbody>
<tr>
<td>Overall</td>
<td>-35 to -40%</td>
<td>-77 to -81%</td>
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<tr>
<td>ETS sectors</td>
<td>-43 to -48%</td>
<td>-88 to -92%</td>
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<tr>
<td>Non-ETS sectors</td>
<td>-24 to -36%</td>
<td>-66 to -71%</td>
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(ranges reflect variation across scenarios)
Roadmap 2050: Investing in the EU economy

- Additional domestic investment: €270 billion annually during 2010-2050, equivalent to 1.5% of GDP, of which key investments are in energy demand sectors
  - built environment (buildings, appliances): €75bn
  - transport (vehicles and infrastructure): €150bn
  - power sector and industry: €35bn
- Fuel savings: €175 to 320 billion on average annually
- Delaying action increases overall investment needs
Example Climate and Energy Package

Modelling regional distribution and costs
EU Climate and Energy Package

ETS

-20% GHG

large industrial installations & aviation

Effort Sharing Decision

“small sources” in Non ETS sectors

20% Renewable Energy Target

Official Journal, 05/06/2009
GHG Target by 2020

-20% compared to 1990

-14% compared to 2005

EU ETS
-21% compared to 2005

Non ETS sectors
-10% compared to 2005

27 Member State targets, stretching from -20% to +20%
Model used to look at distribution

Direct costs as % of GDP

<table>
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<tr>
<th></th>
<th>Cost efficient achievement RES and GHG</th>
<th>+ targets Non-ETS redistributed</th>
<th>+ right to auction redistributed</th>
<th>+ access to JI/CDM (≤ 30 €)</th>
<th>+ targets RES distributed and trading</th>
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Macro Economic Models

- To look at impacts across sectors
- To look at GDP and employment impacts
- To look at competitiveness concerns

- GEM E3, PACE: Applied General Equilibrium Models, global coverage
- E3MG: econometric model (energy-economy-environment), global coverage