Modelling the Macroeconomic Benefits of the Energy Efficiency Directive

Results from the E3ME Model

Round table discussion, International Energy Agency

Unnada Chewpreecha and Hector Pollitt

www.e3me.com
24 January 2013
Disclaimer

• This presentation does not necessarily represent the views of the European Commission
Outline

• The E3ME Model
• Modelling the Energy Efficiency Directive in E3ME
• Key macroeconomic impacts
The E3ME Model
E3ME: Energy-Economy Interactions

**ECONOMY** as in national accounts

**ENERGY** as in energy statistics

**TECHNOLOGY** specifications & costs

**ENVIRONMENTAL EMISSIONS** as in environmental statistics

- **prices and activity** feedback to **ECONOMY**
- **energy** and **fuel use**
- funding R&D to **TECHNOLOGY**
- pollution abatement equipment to **ENVIRONMENTAL EMISSIONS**
- policy, e.g. ETS to **TECHNOLOGY**

- **low carbon processes & products** feedback to **ENERGY**
- e.g. industrial emissions of SF6 to **ENVIRONMENTAL EMISSIONS**

- **energy-saving equipment etc**

**cambridge econometrics**
E3ME Overview

- Econometric model, covering economy, energy and material demands, and CO$_2$ emissions
- Used for economic evaluation of environmental policy
- E3ME Key Strengths
  - coverage at Member State level (plus six other European countries)
  - two-way linkages between economy, energy (and material) inputs and environmental systems
  - detailed sectoral disaggregation
  - a strong empirical grounding
  - short and long-term econometric specification
Modelling the Energy Efficiency Directive in E3ME
Scenario Design

Energy Efficiency Scenarios

- level of targets
  -20%/-30% from BAU/year

- fuel coverage
  coal/oil/gas etc.

- sectoral coverage
  PG/industry/household

- regional coverage

- means to achieve targets
  MBIs/regulations/investment

- direct tax/investment

- revenue recycling

- EU/national

+ sensitivity
  energy price assumptions
## Translating Policies to Model Inputs

### How the Policies Get Translated into E3ME Inputs

<table>
<thead>
<tr>
<th>Policy measure</th>
<th>How the measure is reflected in E3ME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulations</td>
<td>- improvement in energy efficiency through exogenous reduction in household and commerce demand for energy (source: PRIMES Reference scenario projection compared to the Baseline)</td>
</tr>
<tr>
<td>TVs (+labeling) Regulation 2009/642/EC</td>
<td>- assumed labeling costs do not lead to price increases (source: EC press release RAPID)</td>
</tr>
<tr>
<td>Freezers/refrigerators (+labeling) Regulation 2009/643/EC</td>
<td>- assumed slight increase in average price estimated in construction industry to reflect higher costs, derived from an estimate of £100 per energy performance certificate (source: UK Government)</td>
</tr>
<tr>
<td>Circulators Regulation 2009/641/EC</td>
<td>- a small exogenous reduction in middle distillates demand from road transport (source: PRIMES Reference scenario projection compared to the Baseline)</td>
</tr>
<tr>
<td>Recast of the EPBD 2010/31/EU9</td>
<td></td>
</tr>
<tr>
<td>Labelling regulation for tyres 2009/1222/EC</td>
<td></td>
</tr>
</tbody>
</table>

+ more policies..
Impacts of MBIs or Regulations

Main Economic and Energy/Environment Impacts

- Increase in energy prices
- Reduction in energy consumption
- Reduction in emissions

Households

- Loss of real income
- Lower spending

Industry

- Loss of competitiveness
- Loss of jobs
- Worsening trade balance

- Loss of output
Impacts of Tax and Investment

- Reduction in direct taxes
  - Incomes increase
  - Household spending increases
- Investment increases
  - Output and employment increase
Key Macroeconomic Impacts
Key Macroeconomic Impacts

- Results taken from
  - DG Energy *Study for Horizontal Issues Concerning Energy Savings in the EU (2011)* and
  - DG Employment *Studies on Sustainability Issues – Green Jobs; Trade and Labour (2011)*

<table>
<thead>
<tr>
<th></th>
<th>Energy Savings Study (A3E)</th>
<th>Green Jobs Study (S6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target in 2020</strong></td>
<td>-20% final demand from PRIMES 2007 baseline</td>
<td>-20% final demand from PRIMES 2006 baseline case + policies from PRIMES 2010 reference scenario</td>
</tr>
<tr>
<td><strong>Coverage</strong></td>
<td>EU27, all final users and all energy</td>
<td>EU27, all final users and all energy</td>
</tr>
<tr>
<td><strong>Means</strong></td>
<td>regulations/MBI/Investment</td>
<td>regulations/MBI/Investment</td>
</tr>
<tr>
<td><strong>Revenues from MBI</strong></td>
<td>all recycled through reduction in income tax</td>
<td>all recycled through reduction in income tax</td>
</tr>
</tbody>
</table>
## Key Macroeconomic Impacts

<table>
<thead>
<tr>
<th>Percentage difference from baseline, 2020</th>
<th>Energy Savings Study (A3E)</th>
<th>Green Jobs Study (S6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Household consumption</td>
<td>-0.1</td>
<td>n/a</td>
</tr>
<tr>
<td>Govt. consumption</td>
<td>0.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Investment</td>
<td>1.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Exports</td>
<td>-0.1</td>
<td>n/a</td>
</tr>
<tr>
<td>Imports</td>
<td>-0.2</td>
<td>n/a</td>
</tr>
<tr>
<td>Consumer prices</td>
<td>1.8</td>
<td>n/a</td>
</tr>
<tr>
<td>Employment</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Real household incomes</td>
<td>-0.1</td>
<td>-0.4</td>
</tr>
<tr>
<td>Final energy demand</td>
<td>-11.4</td>
<td>-16.6</td>
</tr>
<tr>
<td>CO₂ emissions</td>
<td>-8.6</td>
<td>-14.5</td>
</tr>
<tr>
<td>ETS price (€08/tCO₂)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Sectoral Impacts

Green jobs study: 2020 sectoral employment impacts (% difference from baseline)

Distributional Impacts

All households
Expenditure Groups
First quintile
Second quintile
Third quintile
Fourth quintile
Fifth quintile
Socio-economic groups
Manual workers
Non-manual workers
Self-employed
Unemployed
Retired
Inactive
Population Density
Densely-populated
Sparsely-populated