Modelling the potential for industrial energy efficiency in IEA’s WEO

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Emerging economies determine industrial energy growth

Global industrial energy demand increases by almost 40% up to 2035
Today’s industrial energy demand

Energy flows in the industry sector, 2010

- Coal: 926 Mtoe
- Oil: 714 Mtoe
- Gas: 615 Mtoe
- Renewables: 197 Mtoe
- Electricity and heat: 765 Mtoe
- Iron and steel: 436 Mtoe
- Coke oven and blast furnaces: 253 Mtoe
- Chemicals and petrochemicals: 393 Mtoe
- Feedstock for petrochemicals: 543 Mtoe
- Cement: 247 Mtoe
- Pulp and paper: 150 Mtoe
- Other industry: 1195 Mtoe

Energy intensive sectors represent around 60% of industrial energy demand
Modelling industrial energy demand

Industry accounts for more than a third of final energy consumption, but modelling faces difficulties:

- No dominating sub-sector, many different production processes
- Energy savings can impact on product quality and thus limit deployment
- Data problems as energy consumption can evolve quickly and autoproduction can distort energy consumption
### Sub-sectors in industry

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>Activity variables</th>
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<tbody>
<tr>
<td>Iron and steel</td>
<td>Crude Steel</td>
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<td>Chemical and petrochemical</td>
<td>Ethylene</td>
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<td>Propylene</td>
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<td>Cement</td>
<td>Cement</td>
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<td>Pulp and paper</td>
<td>Paper</td>
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</table>
| Other industries            | Value-added in industry        

*Four energy-intensive sectors are explicitly modelled*
Description of industry model

- Activity projection
  - Econometric projection based on value added, price and pop.
- Energy intensity
  - Process changes (e.g. primary vs secondary steel-making)
  - Technical energy savings
  - Systems optimisation
  - Operational efficiency
- Fuel shares
  - Multiple logit model, electricity and fuel treated separately
Process steps by sub-sector in industry

Industry modelling in WEM accounts for process changes in the various sub-sectors
Acceptable payback periods and technology penetration vary with the scenario and the corresponding policy assumptions.
While growth will significantly slow down for iron & steel and cement, other industry sectors see continued growth, particularly in non-OECD countries.
Energy demand development

Average annual change in industrial activity, efficiency and energy demand, 2010-2035

Energy demand will increase in all sub-sectors as rapid growth in industrial production outpaces energy efficiency improvements.
Energy efficiency can cut industrial energy demand growth by around 30%
Policies to overcome existing barriers

- Numerous barriers impede the implementation of energy efficiency: short payback periods, lack of awareness, distraction from core business, production interruption

- Efficiency policies
  - Funding of research
  - Requirements for energy audits and management systems
  - Training and capacity building
  - Performance requirements
  - Financing mechanisms
Conclusions

- Industry is a driving factor behind energy demand growth in the future
- Energy efficiency can slow down this growth by around 30%
- Recent data and solid characterisation of production process are crucial for industrial energy modelling
- Future research needs to shed more light on the black box ‘non-energy-intensive’ industries