

US-UK Comparison: Technologies, Attitudes and Barriers in Industrial Energy Efficiency

by Andrew Timmis
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The
University
Of
Sheffield.





Presentation Overview

- Project Brief
- Industry: General
- Cement Industry
- Iron and Steel Industry
- Conclusions
- Questions



AEA

A multidisciplinary consultancy;

- Energy
- Climate Change
- Environment



Major clients;

- UK, EC and US Government departments
- FTSE 350 companies
- Global businesses

Principal technical consultant to Government on Industry Climate Change Agreements and Carbon Reduction Commitment Energy Efficiency Scheme

Expansion into North American market through recent acquisitions



Project Brief

Aims

Investigate several industries ;

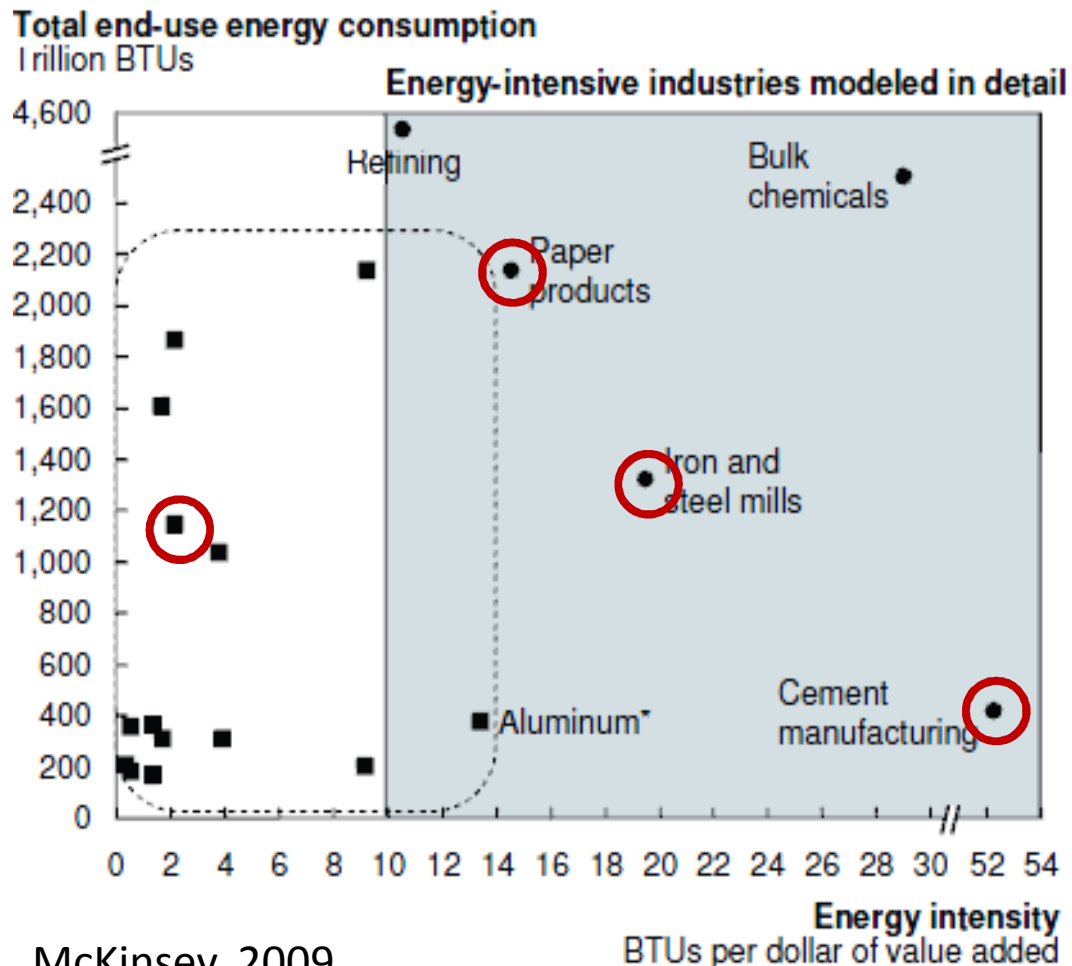
- Scale of production and production processes
- Research uptake of energy efficiency measures
- Identify drivers and barriers to uptake
- Suggest technology/knowledge transfer (e.g. BAT and practice)

Methodology

- Literature Survey
 - Academic Literature
 - Government Agencies
 - Industry and Trade Associations
 - Equipment Manufacturers

Industry: General

- Identification of industries



McKinsey, 2009

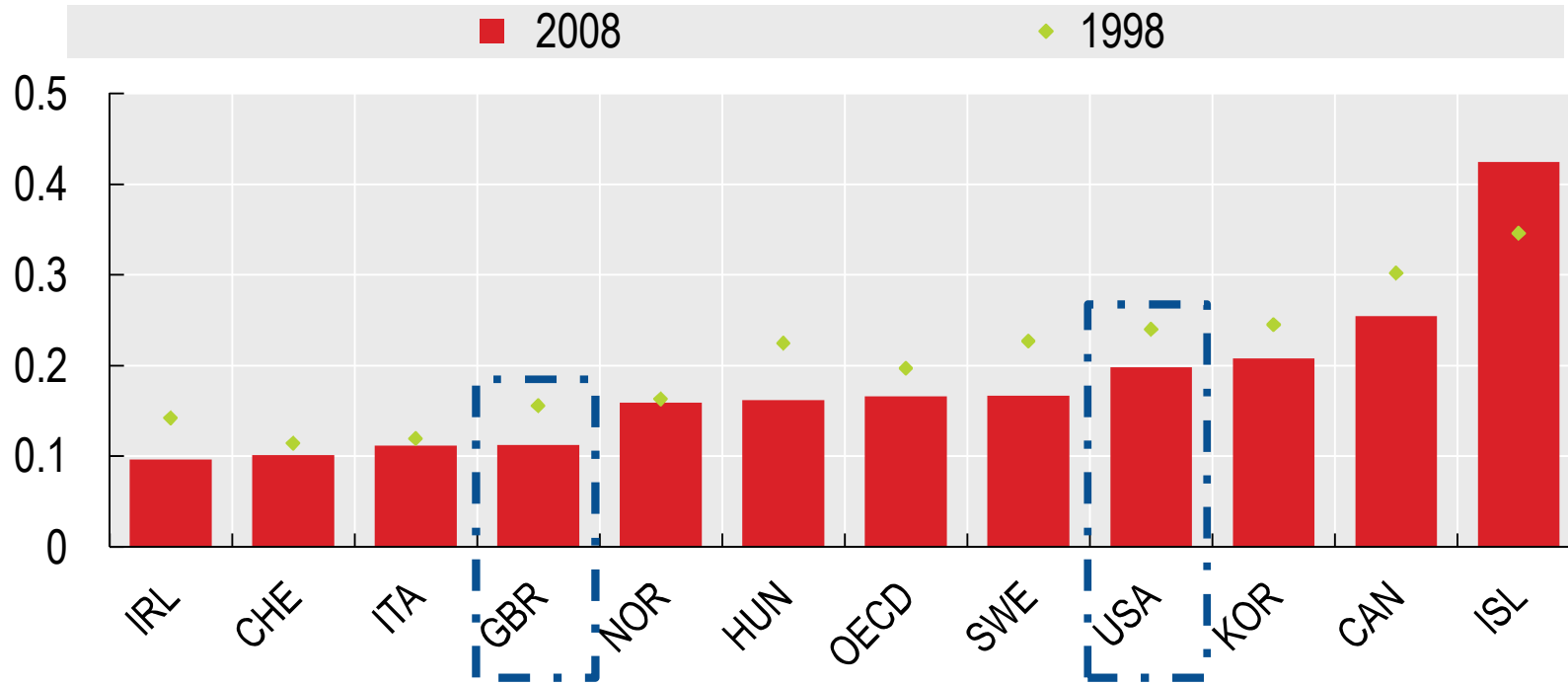
High energy intensity
(Cement)

Commercial and political
importance (Iron and Steel)

Large energy consumer
(Pulp and Paper)

*Special interest (Food and
Drinks Sector)*

Industry: General



Source: OECD, 2010 (Tonnes of oil equivalent per thousand US\$ of GDP at PPP)

- IEA/OECD predict that global industry energy use could be cut by 20% through adoption of BAT
- McKinsey report estimates energy savings in the US could total \$1.2 trillion in the next decade. Industry energy savings of 18% (compared to BAU)

Industry: General

| Efficiency Driver | US | UK |
|--|----|----|
| Economic Potential and Competitiveness | ✓ | ✓ |
| Energy Security | ✓ | ✓ |
| Environmental | ✓ | ✓ |

Industry: General Barriers

| Barrier | US | UK |
|---|----|----|
| Disjointed Political Power and Responsibility | ✓ | |
| Education <ul style="list-style-type: none">• Knowledge in SMEs• Available finance, subsidy, support and policy• Energy use within production process | ✓ | ✓ |
| Protectionism | ✓ | ✓ |
| Investment Culture <ul style="list-style-type: none">• Return on investment ~3 years• Uncertainty and mistrust about claims and potential savings | ✓ | ✓ |

Cement Industry

- Two main kiln processes, Wet and Dry
- Dry 50% reduction in energy use (EC, 2010)

| UK | US |
|---|---|
| Highly consolidated ownership 93% of production by three companies | Less consolidated ownership 90% of production by ten companies Smaller regional operators Owner-operator mills |
| Annual Production 10.1 Mt (2008) | Annual Production 83.3 Mt (2008) |
| 90/10 Dry-Wet production split | 80/20 Dry-Wet production split |
| Potential Savings 0.8GJ/t (IEA, 2009) | Potential Savings 1.5 GJ/t (IEA, 2009) |

Cement Industry: Barriers

| Barrier | US | UK |
|--|----|----|
| Identifying and implementing energy efficiency measures – Low priority, compared to regulatory demands | ✓ | |
| Limited Capital e.g. Owner-operator mills | ✓ | |
| Production Interruption <ul style="list-style-type: none"> • Significant close down due to upgrades | ✓ | ✓ |
| Retrofit vs. New Build | ✓ | ✓ |
| Cement production produces vast amounts of chemical CO ₂ | ? | ✓ |

Cement Industry: Technology and Knowledge Transfer

| Transfer | Direction |
|---|----------------|
| Increase use of cement replacing materials e.g. GGBS, PFA | UK → US |
| Implementation of tax on energy use e.g. CCA, CCL, EU ETS | UK → US |
| Implications of increased use of substitute fuels (waste) e.g. Netherlands ~80% | EU → US and UK |

Iron and Steel Industry

- Steel production split, primary (integrated) steel making, and secondary (EAFs)
 - EAFs consume half the energy of integrated steel making (BOF) (EC,2001)
- Increasing global capacity of alternative iron (DRI), bypasses need for integrated steel, DRI represents a significant cost and energy saving

| UK | US |
|---|---|
| Highly consolidated ownership, integrated steel making dominated by TATA steel, NE UK and S.Wales | Diverse ownership Integrated steel making in 'Rust-belt' States. |
| Annual Production 10.1 Mt (2008) | Annual Production 58.1 Mt (2008) |
| 80/20 Primary-Secondary production split | 43/57 Primary-Secondary production split |
| Potential Savings 2.1GJ/t (IEA, 2009) | Potential Savings 2.4 GJ/t (IEA, 2009) |

Iron and Steel Industry: Barriers

| Barrier | US | UK |
|--|----|----|
| Increasing global production capacity <ul style="list-style-type: none">• 50 % global production capacity in China• Global capacity utilisation 74%(2009) | ✓ | ✓ |
| Investment culture within the US | ✓ | |
| Changes in the global steel market <ul style="list-style-type: none">• High growth of steel production and alternative iron | ✓ | ✓ |
| Recent investment activity of US steel manufacturers | ✓ | |

Iron and Steel Industry: Technology and Knowledge Transfer

| Transfer | Direction |
|--|-----------|
| Mini-mills (secondary steel making) <ul style="list-style-type: none">• Recent development of micro-mills e.g. Castrip Crawfordsville, Indiana, 80% energy saving in casting | US → UK |
| Changes to the way in which blast furnace slag is cooled, production GGBS for cement industry | US → UK |

Energy savings of BAT limited to 20% (IEA, 2009) Needs to be a step change in process for further additional savings e.g. ULCOS



Conclusions

- No one single technology or knowledge transfer for industries
- Needs for a sector by sector approach to energy efficiency strategy
- Most important difference; UK policy (e.g. CCL, CRC, CCA) acceleration of market forces by inflating cost of energy



Future Research

- More detailed sector research
- Effect of carbon legislation on business, sectoral approach or uniform
- Identifying energy efficiency potential through LCA
- How to promote energy efficiency to SMEs



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Questions

Contact:

Andrew Timmis, E-Futures DTC, University of Sheffield

e-mail: andrew.timmis@sheffield.ac.uk