Agenda

- Overview of IEA 4E Mapping and Benchmarking
- Main presentation:
  
  *Benchmarking of the market impact of phase-out of inefficient domestic lighting products*

- Q&A
Introduction to the 4E

- Mapping and Benchmarking is part of the IEA Implementing Agreement for a Co-operating Programme on Energy Efficient End-Use Equipment (4E)

**Diagram:***
- **4E EXECUTIVE COMMITTEE**
  - Management of 4E

- **4E COLLABORATIVE PROJECTS**
  - Including Mapping & Benchmarking

**Annexes:**
- **ELECTRIC MOTOR SYSTEMS ANNEX**
  - Encourages alignment on policies proven to be effective for motors and motor systems

- **SOLID STATE LIGHTING ANNEX**
  - Develops tools, test methods and policies to ensure high quality LED lighting

- **ELECTRONIC DEVICES AND NETWORKS ANNEX**
  - Monitors the energy consumed by connected devices and their networks and identifies government policies to minimise energy consumption
Participating Countries

- Australia
- Austria
- Canada
- Denmark
- France
- Japan
- The Netherlands
- Republic of Korea
- Sweden
- Switzerland
- United Kingdom
- United States of America

Also seek information from other major trading blocks eg: EU, China, etc
How the Mapping and Benchmarking Activity Works

Product Definition

Mapping individual country data

Benchmarking all country data
Goal and Scope of the Benchmarking

- Examines:
  - The approach and stringency of ‘phase-out’ regulations;
  - Changes in the type of products entering each market (indicating major policy outcomes);
  - Changes in the overall average efficiencies of products entering the market (indicating longer term efficiency improvements of the installed stock); and
  - Key areas of concern for policy makers where additional or modified policy intervention may be required.
  - NOT a comparison of the efficiency of individual products

- Products investigated are those applicable to the domestic sector (i.e. general service Incandescent, halogen, compact fluorescent and LED lamps)
### Data quality

<table>
<thead>
<tr>
<th>Country</th>
<th>Policy information</th>
<th>Benchmarked sales data</th>
<th>Efficacies</th>
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<tbody>
<tr>
<td>Australia</td>
<td>Robust</td>
<td>All data Indicative except LEDs and double ended halogen which are Illustrative</td>
<td>Indicative</td>
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<td>Austria</td>
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<td>Japan</td>
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<td>Korea</td>
<td>Robust</td>
<td>Majority of data Indicative. All halogen data illustrative</td>
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<td>EU</td>
<td>Robust</td>
<td>All data Indicative</td>
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- **Robust**: solid lines on graphs
- **Indicative**: dashed lines on graphs
- **Illustrative**: dotted lines on graphs
Normalisation of Results for Comparison and Cautions

- Lamp efficiencies (efficacies) based on international averages
  - adjusted for estimated efficiencies in previous years
- No normalisation undertaken for lamps with internal or external ballasts (integral or external), ie CFLs and LEDs
- Lamps with filaments adjusted for voltage differences based on IEC 60064 comparisons and empirical data.
  - Applies to “Incandescent” and Halogen

Cautions:

- A number of cautions apply, most critically:
  - Improvements in the efficiency of the average installed lamp (stock) will be more rapidly than improvements in the average efficiency of sales
  - Lamp sales are falling, therefore percentage of sales not true metric
  - Very limited account taken of cultural factors affecting purchase
Phase Out Regulations:  
*Overall Timing, Stringency and Scope*

- Regulations do not ban technologies but set minimum standards for all
- Normally implemented in stages, larger lamps first, with exclusions for specific circumstances
- Generally have extra requirements to satisfy consumers – in some cases extending to minimum performance requirements for certain lamps, eg CFLs, “covered lamps”, etc.
Phase-out regulations: Significant differences in detail

When examined in more detail, some significant differences in approach:

- The **overall regulatory approach** to performance levels.
- The **stringency** at which the required performance levels are set and the associated **phasing or speed** with which the required actions come into force.
- The **range of light outputs and products** included in the regulations.
- The **products exempted** or requiring lower performance levels.
- The **tolerances and allowances** applicable in testing and declaring product performance.
Phase-out regulations: Key Issues for Policy Makers

- **Lamps** are the most globally traded consumer **durable**, yet there remains major differences in regulations.
- If the political will exists **alignment** of efficiency requirements scopes and exclusions should be technically **relatively simple**.
- Such alignment would result in:
  - Substantial additional energy savings; better supplier understanding and compliance; potential for local and cross border enforcement actions; increased global trade; and likely cost reductions for consumers.

- Efforts ongoing (eg IEA 4E SSL Annex and IEC), but limited success to date – Smart Lamps present new opportunity.
Impact of Phase-out: Big Fall in Incandescent Sales

- Prior to introduction of phase-out regulations, slow decline in sales
- Regulations in Australia (09) and EU (09-12) result in precipitous fall in sales.
- Korean regulations begin 2003 and revised twice = best results

- Canada: CFL push 04-08 but no market movement anticipating 2014 regulation
- No regulation in Japan, but voluntary agreement and impact of 2011 tsunami have driven cultural change.
Impact of Phase-out: Incremental regulation in EU
Impact of Phase-out: Disappointing Increases in Efficiency

- Typically increase from 12-15lm/W to 17-20lm/W
- Australia (14lm/W to 27lm/W) and Korea (mid-40lm/W) two outliers
Impact of Phase-out: So Why Little Increase in Efficacy? CFL and LED Sales

- CFLs: Increase in sales generally small (Australia, Japan and Korea excepted)
- LED received much hype, but in 2013 still only 3-15% of any market
Impact of Phase-out: So Why Little Increase in Efficacy? Increasing Halogen Sales

Percentage of all sales that are halogens

- Australia
- Austria
- Canada
- Denmark
- Japan
- Republic Of Korea
- United Kingdom
- EU
- Poland and Spain

Impact of Phase-out: Combined Incandescent/Halogen Sales

- EU sales appear to be stabilising at around 80% of market, Canada appears to be following the same path (also Australia to a degree).
- Rapid policy interventions required to maintain momentum and prevent halogens becoming the new “default” consumer choice.
Market Knowledge is Limited

- Despite efforts by many countries, **limited market knowledge is hampering policy development, monitoring and enforcement**
- **Better knowledge of sales** allows monitoring of existing policy implementation to understand new product developments and/or circumvention of existing regulations;
- **Improved knowledge of in-home application and usage patterns** improves modelling of planned future regulations and evaluating impact based on sales
Key Issues for Policy Makers

- Where mandatory regulation has been introduced for a significant period (Australia, the EU and Korea):
  - The reaction of the market has been substantial with precipitous falls in the sales of Incandescent lamps. Canada appears to be following a similar path.
  - Not reflected in increase in limited increase efficacy due to significant migration to Halogens
  - Market interventions urgently required to stop Halogens becoming the new consumer default purchase (eg implementation of EU 2016 phase 6 regulations, accelerating US 2020 regulations, or similar)
  - The results from regular revisions in Korea show what is possible.
Key Issues for Policy Makers

- Non-regulatory interventions in the lighting market require ongoing commitments with impact rapidly tailing when intervention ceases.

- Better market and usage data is required to enable policy makers to develop more robust policy, to monitor the implementation of that policy, and to measure resultant impacts.
http://www.iea-4e.org/

http://mappingandbenchmarking.iea-4e.org/matrix?type=productreports

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Questions?