IEA Implementing Agreement
Energy Efficient End-Use Equipment

Presentation by

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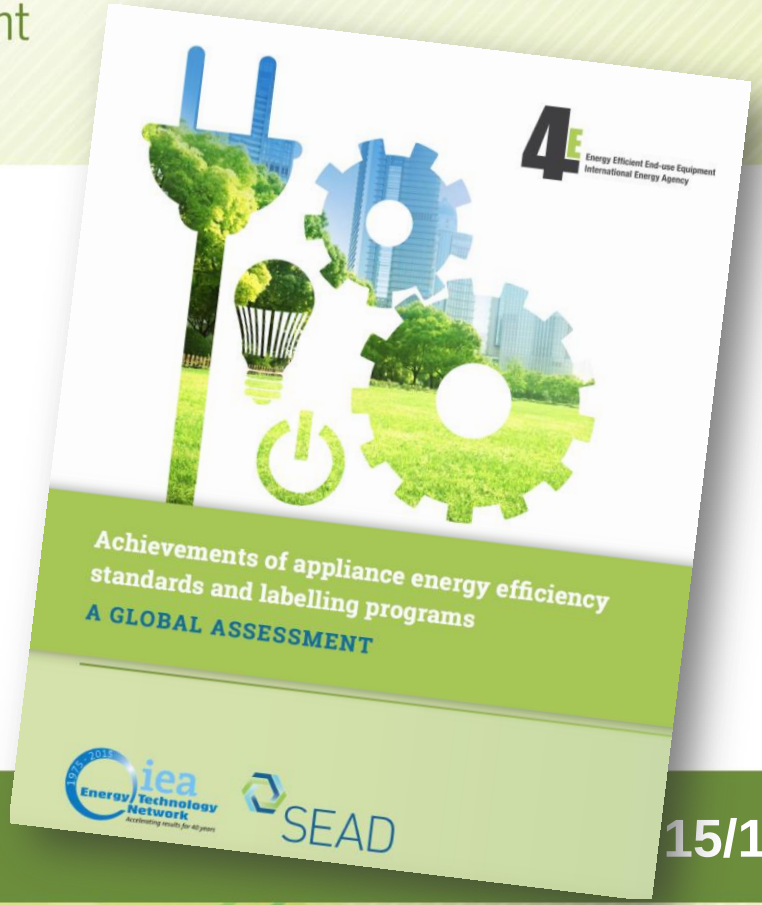

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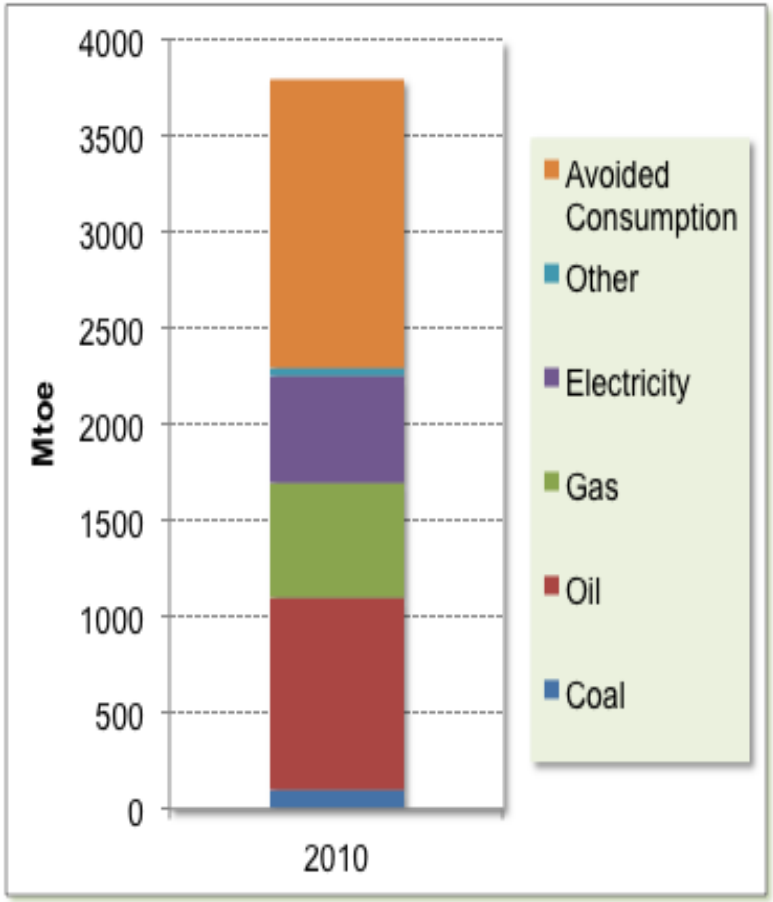
Energy Efficiency – the *FIRST FUEL*

- In 11 IEA countries*, energy savings exceeded the output from any other single fuel source in 2010
- The result of cumulative investment in energy efficiency since 1974

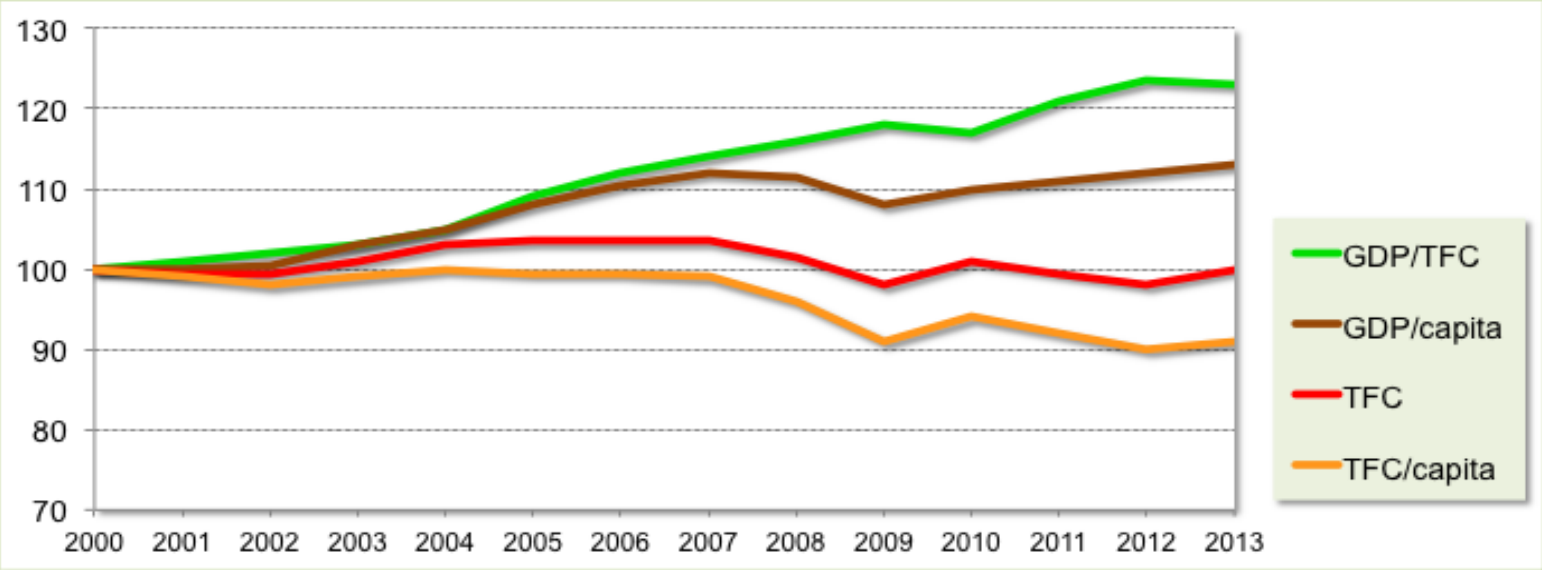


Source: IEA, Energy Efficiency Market Report 2013

*Australia, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Sweden, the United Kingdom and the United States

Energy Efficiency & Economic Development

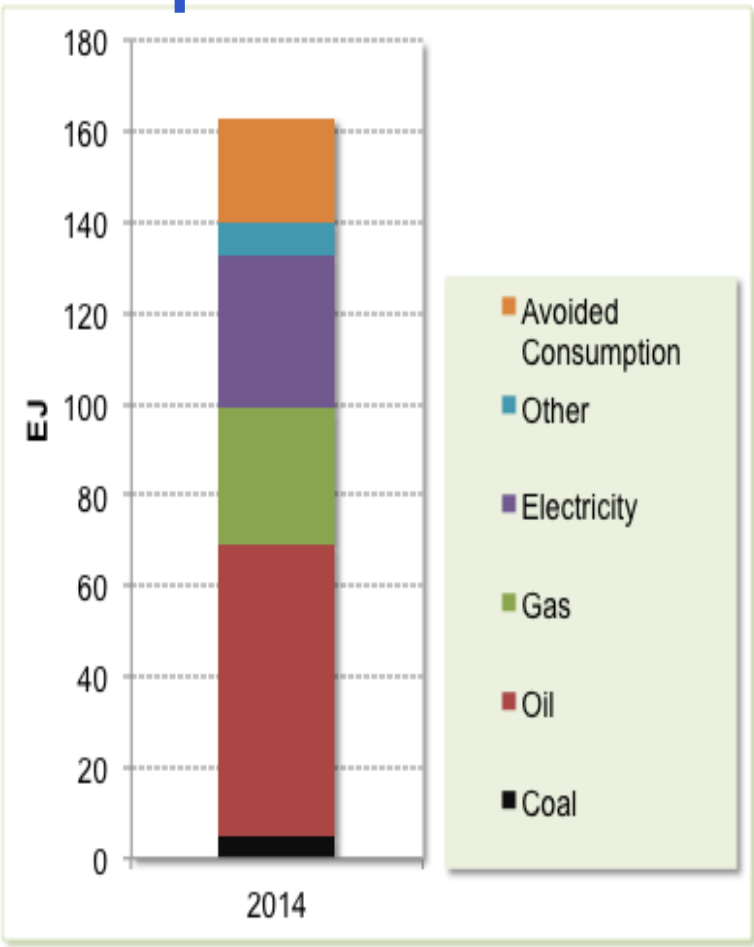
- **Energy efficiency has led to a decoupling of economic and energy growth.**
- **In 2013, OECD energy consumption = 2000 levels, while GDP expanded by 26%.**



Source: IEA, Energy Efficiency Market Report, 2015

Energy Efficiency – Multiple Benefits

- In 2014, all IEA countries energy efficiency investment since 1990 led to…....
- 22 EJ in avoided fuel consumption (=32 EJ primary energy)
- USD 550 billion in saved costs to consumers
- 190 Mtoe replaced energy imports by locally supplied efficiency
- 820 $MtCO_2$ in greenhouse gas emissions reductions

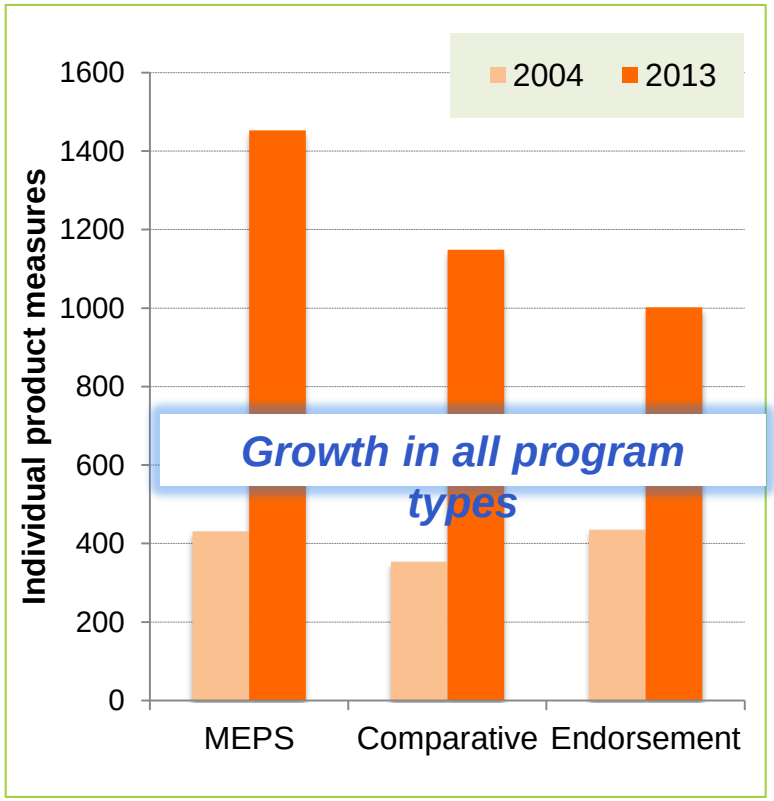


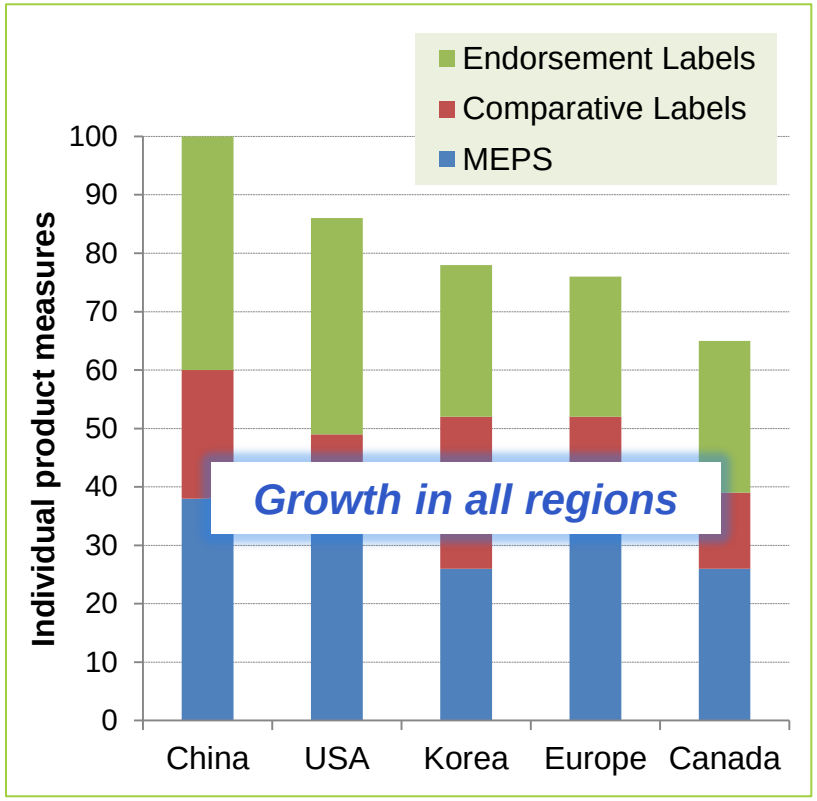
Source: IEA, Energy Efficiency Market Report, 2015

Achievements of EESL programs

- Report provides an authoritative summary of **past achievements** of national energy efficiency standards and labelling (EESL) programs for **appliances & equipment**.
- EESL programs include:
  - Minimum energy performance standards (MEPS)
  - Mandatory comparison labels (usually stars or numbers)
  - Endorsement labels (the best in class)
- EESL programs operate in >80 countries, covering >50 different types of equipment in all sectors.
- They provide the cornerstone of most national energy efficiency and climate change mitigation programs.

Summary of policy measures, by measure type for selected countries, 2013





Source: Harrington, L., J. Brown, and M. Caithness, Energy standards and labelling programs throughout the world in 2013, 2014, Energy Effcient Strategies

Efficiency & Energy Savings

Products

- The energy efficiency of major appliances have increased at more than 3x the underlying rate of technology improvement in countries with EESL programs.
- One-off improvements of more than 30% have been observed.

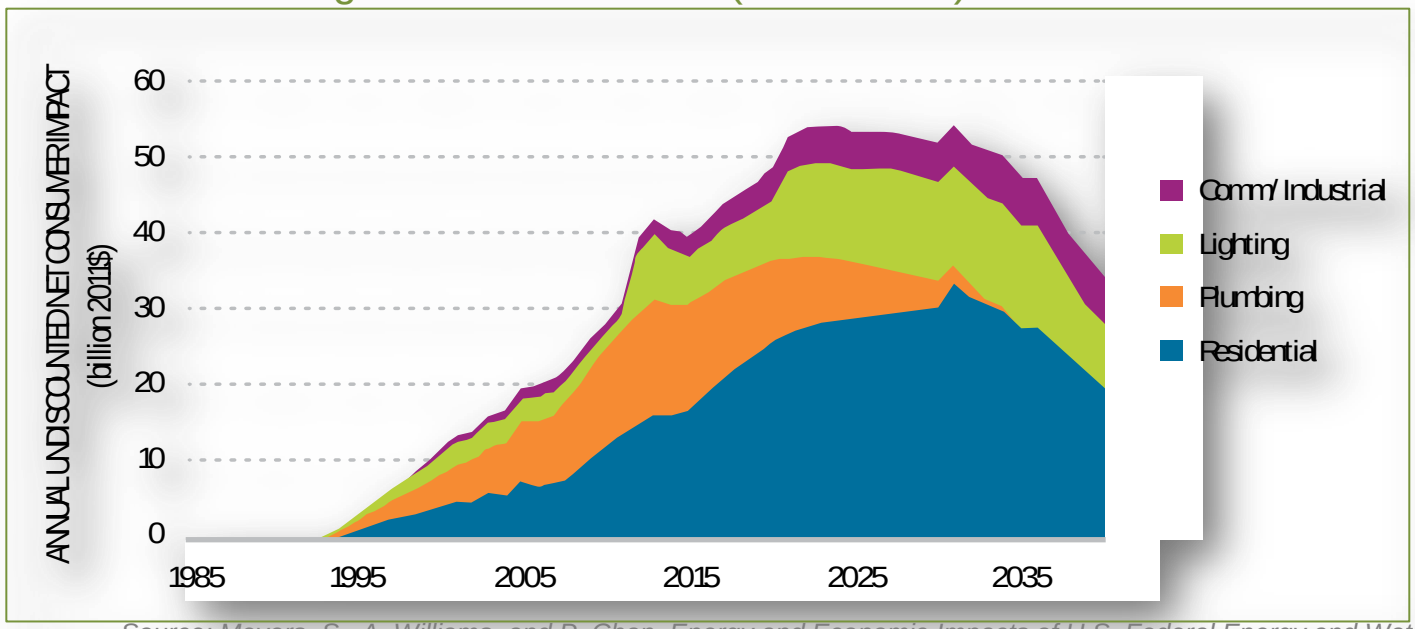
National Energy Consumption

- The most mature national EESL programs covering a broad range of products are estimated to save between **10% and 25%** of national or relevant sectoral energy consumption.

Cost-benefit

- In all programs reviewed, the national benefits outweighed the additional costs by a ratio of at least **3 to 1.**
- Note: Impacts take account of likely **rebound effect.**

Net cost savings to US consumers (USD billion)

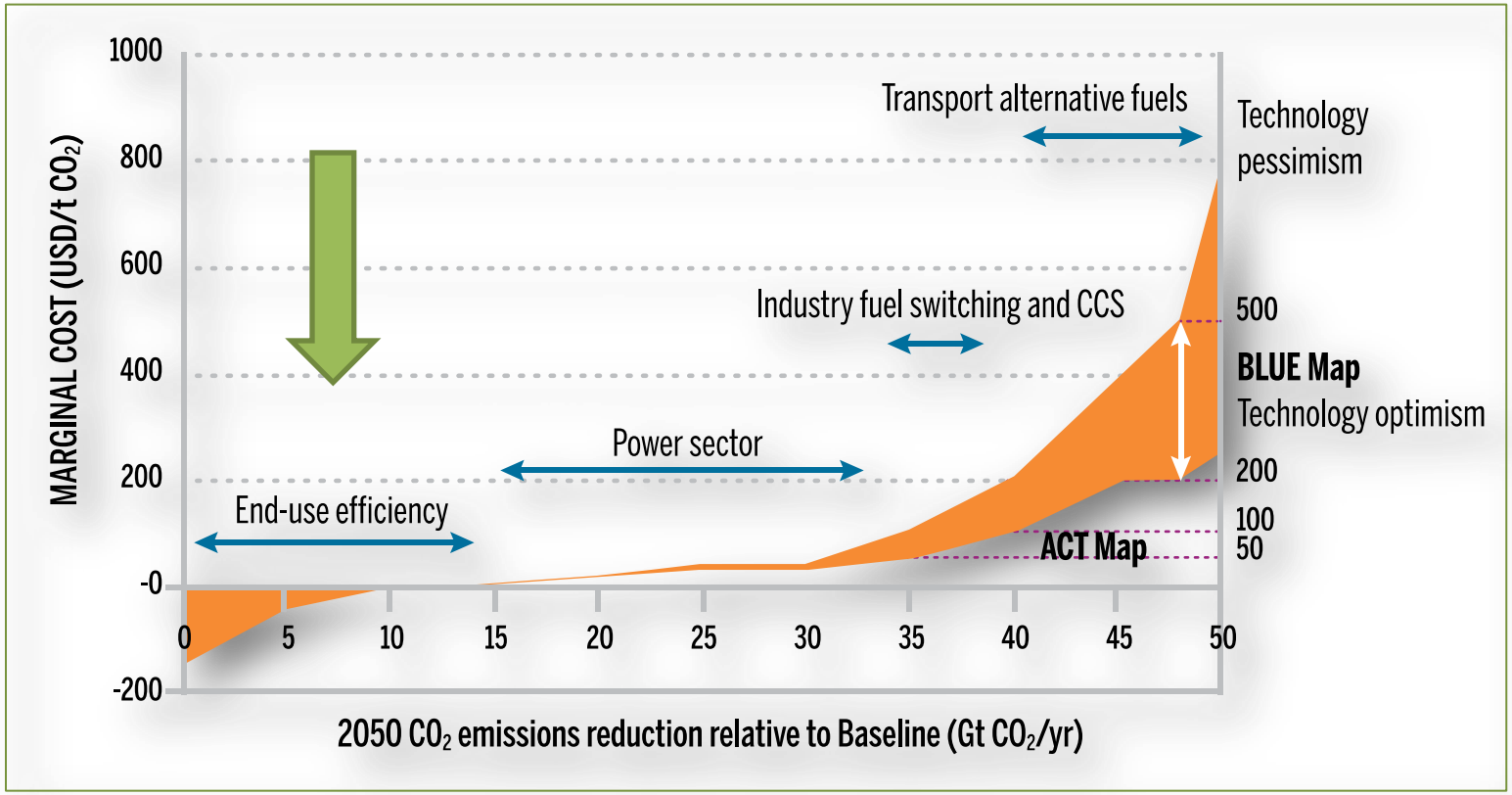


Source: Meyers, S., A. Williams, and P. Chan, Energy and Economic Impacts of U.S. Federal Energy and Water Conservation Standards Adopted From 1987 Through 2013, 2014, LBNL, USA: Berkely, California.

Cost of greenhouse gas reductions

- EESL programs deliver energy and CO_2 reductions **while also** reducing total costs.
- This compares extremely favourably with the cost of other clean energy options.
- Supports the conclusion: end-use efficiency measures offer **the least cost pathway** to energy and CO_2 emission reductions.
- See following figure.

Marginal emission reduction costs for the global energy system, 2050

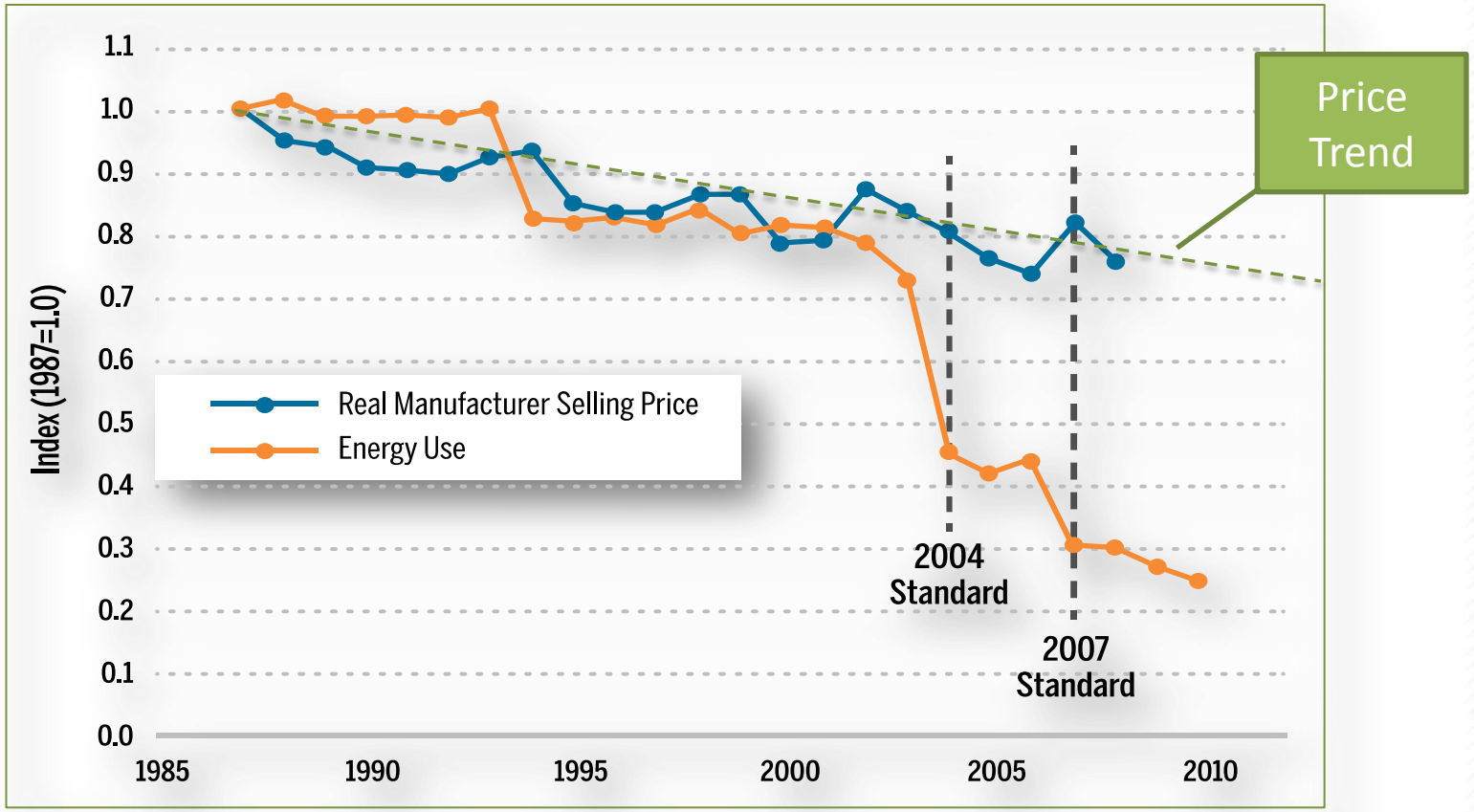


Source: IEA, Energy Technology Perspectives: Scenarios and Strategies to 2050, 2008, International Energy Agency/ OECD

Impact on appliance prices

- Appliances and equipment covered by EESL programs have not only dramatically improved in efficiency over the past 20 years, **but are also** cheaper to purchase.
- While EESL programs may have caused small changes in prices close to the implementation of new energy efficiency measures, they appear to have had **little long-term impact** on appliance price trends.
- EESL programs are very good at fostering innovation. Suggests that it will be **cost-effective to be more ambitious** in setting performance thresholds.

Price and energy trends for clothes washers in the USA



Source: Nadel, S. and A. deLaski, Appliance Standards: Comparing Predicted and Observed Prices, 2013

Additional impacts

- EESL programs deliver very significant co-benefits such as:
  - Job creation
  - Improved air quality
  - Savings in health costs
- These may be very large and further enhance the cost-benefit case for EESL programs.
- The contribution made by increased energy efficiency in these areas may be sufficiently large in their own right to justify EESL programs in some jurisdictions.

Conclusions

- EESL programs have substantially reduced energy use and CO_2 emissions - very much cheaper than could have been achieved by other clean energy supply options.
- This conclusion takes into account any rebound effect.
- Improved health from higher thermal comfort and/or avoided air pollution; job creation and energy security - provide added justification for these programs.
- All EESL programs have the potential to expand in scope and ambition to deliver more energy and CO_2 savings.
- Governments should note these findings when determining investment options and priorities for meeting energy demand.

Acknowledgements

- This report is based on research undertaken for the IEA Implementing Agreement for a Co-operative Programme on Energy Efficient End-Use Equipment (4E).
- Thanks to the Super-Efficient Equipment and Appliance Deployment (SEAD) initiative and the large number of experts that have provided input to this meta-data analysis.

Networked Devices

- Networked Devices always in standby modes drawing additional power to maintain network connectivity
- Number of networked devices is increasing rapidly - 100 billion networked devices by 2030. Consuming more than 6% of current total final global electricity consumption.
- Uptake of best available technologies could reduce energy demand by up to 65%
- Huge opportunity for energy savings in devices and networks

IEA Report: *More Data, Less Energy: Making Network Standby More Efficient in Billions of Connected Devices*

https://www.iea.org/publications/freepublications/publication/more-data-less-energy.html

Mandate from G20 EE Action Plan

- Participating countries will work together to accelerate the development of new ways to improve the energy efficiency of networked devices.
- In 2015, this work will include consideration of options for goals for reducing the global standby mode energy consumption of networked devices.

Involvement of Government & Industry

- **Connected Device Alliance** between governments and industry
- 19 government energy efficiency agencies (see table) have participated
- Additional liaison through SEAD & IPEEC
- Industry Participation through 3 workshops and 26 teleconferences.

Australia	Germany	Spain
Austria	Japan	Sweden
Canada	Korea	Switzerland
Denmark	Netherlands	Turkey
European Commission	Mexico	United Kingdom
France	Singapore	USA

Achievements of G20 Work

- **Development of a Common Goal**
  - *Maximize network-enabled energy savings and minimize the energy consumption from all networks and network-connected devices*
- **Key outputs in 2015:**
  - Voluntary **Design Principles** for the design and operation of connected devices
  - Voluntary **Policy Principles** to encourage a common global framework
  - A set of global **Definitions** to underpin the development of policies and initiatives
  - **Centre of Excellence** to promote best practices, including IE
    - DESSC Paper on ICT-Enabled Intelligent Efficiency
  - Development of **Awards** to recognize significant achievements
- Short video at http://edna.iea-4e.org/cda

Next Steps for 2016 and beyond

- G-20 Energy Minsters Commique endorses the work and agrees to continue future collaboration
- G20 and CDA participants keen to develop longer term plans
- Launch of new phase of **Connected Devices Alliance**.
  - Workshop scheduled May 19 & 20 at IEA HQ in Paris
    - Welcome broad-representation at the workshop;
    - Email OA Steve Beletich (info@edna.iea-4e.org)
- Government-funded Scoping Study on Initiatives and Policy Options for governments to encourage IE
- Formulation of working group on IE measurement methodologies

cda
connected devices
ALLIANCE