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IEA Implementing Agreement
Energy Efficient End-Use Equipment

**Achievements of appliance energy efficiency
standards and labelling programs**

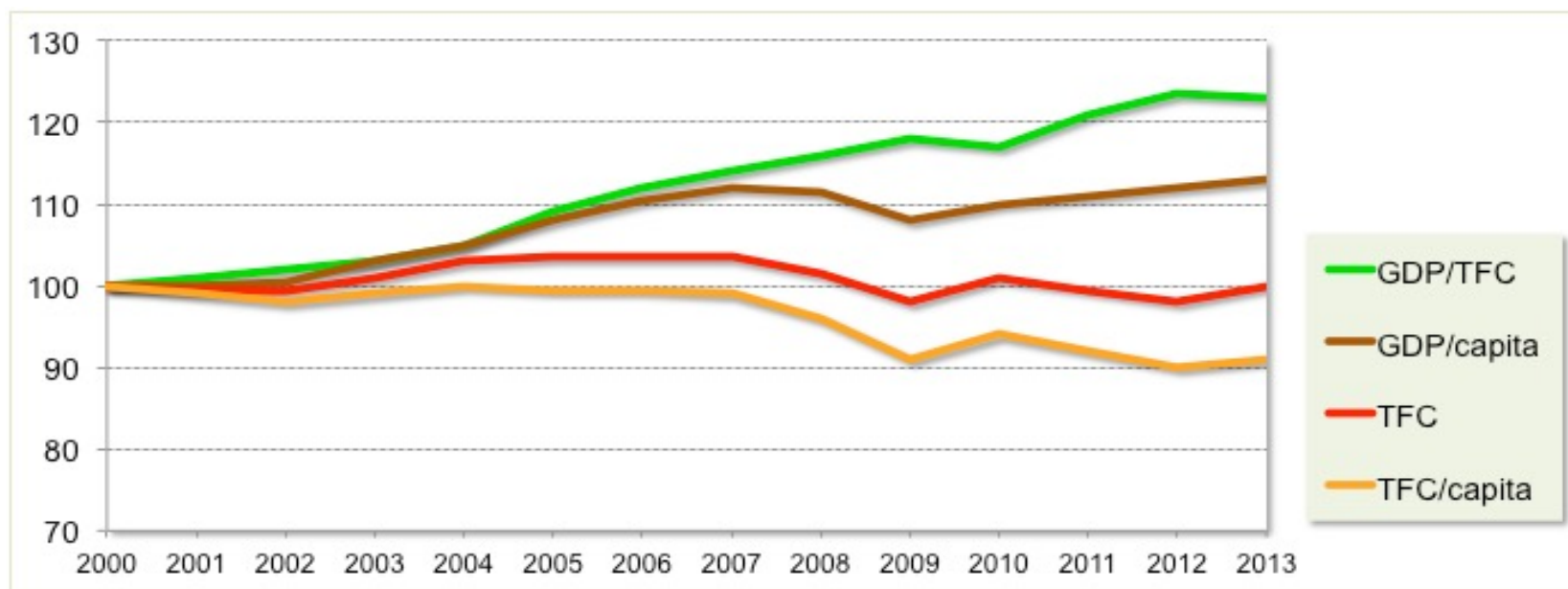
A GLOBAL ASSESSMENT IN 2016

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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%.



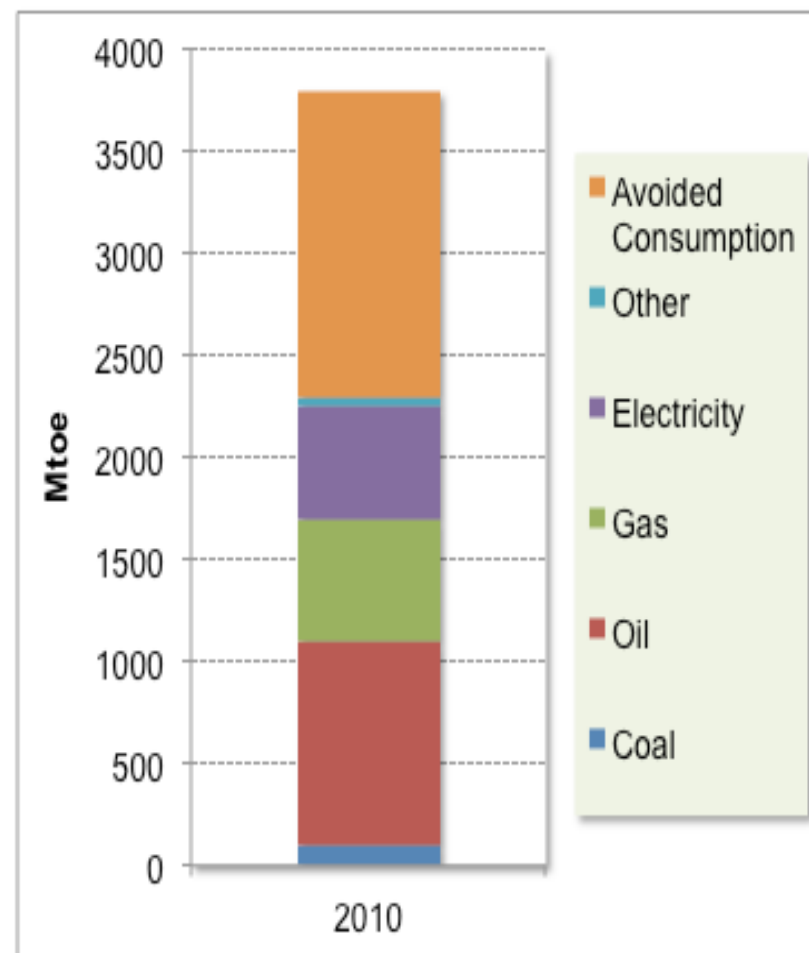
Source: IEA, Energy Efficiency Market Report, 2015

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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

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

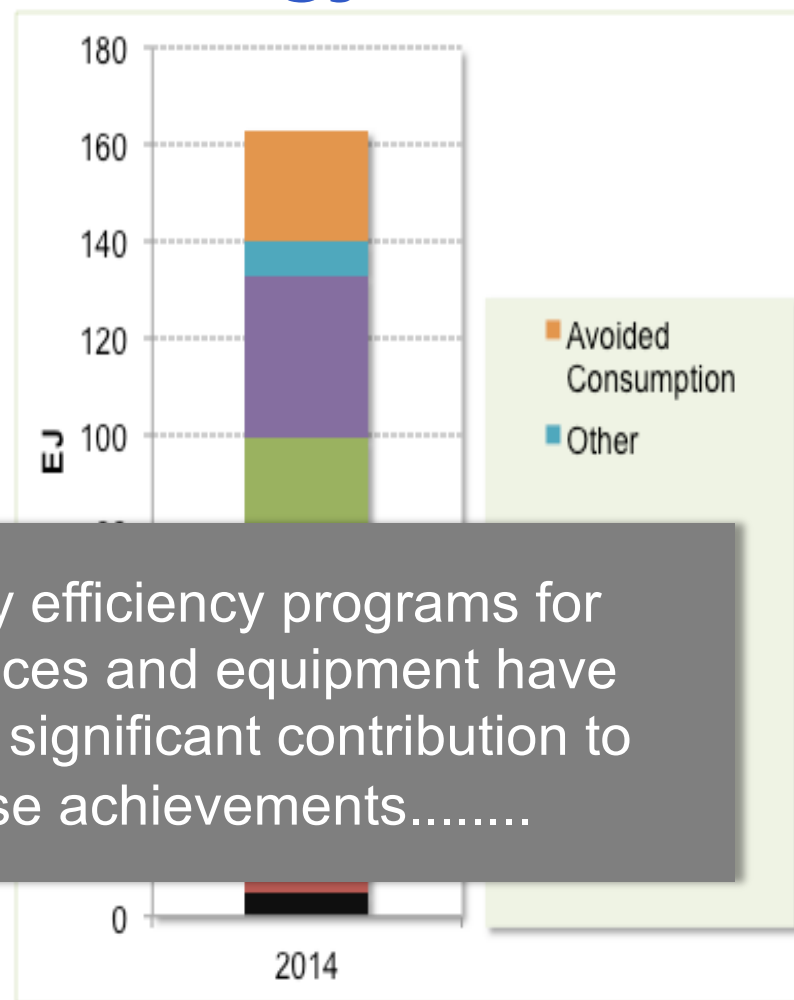


Source: IEA, Energy Efficiency Market Report 2013

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The Multiple Benefits of Energy Efficiency

- In 2014, all IEA countries energy efficiency investment since 1990 led to.....
 - 22 EJ avoided fuel consumption
 - 32 EJ avoided primary energy
 - USD 550 billion savings to consumers
 - 190 Mtoe of energy replaced by locally sourced efficiency
 - 820 MtCO₂ in green emissions reductions



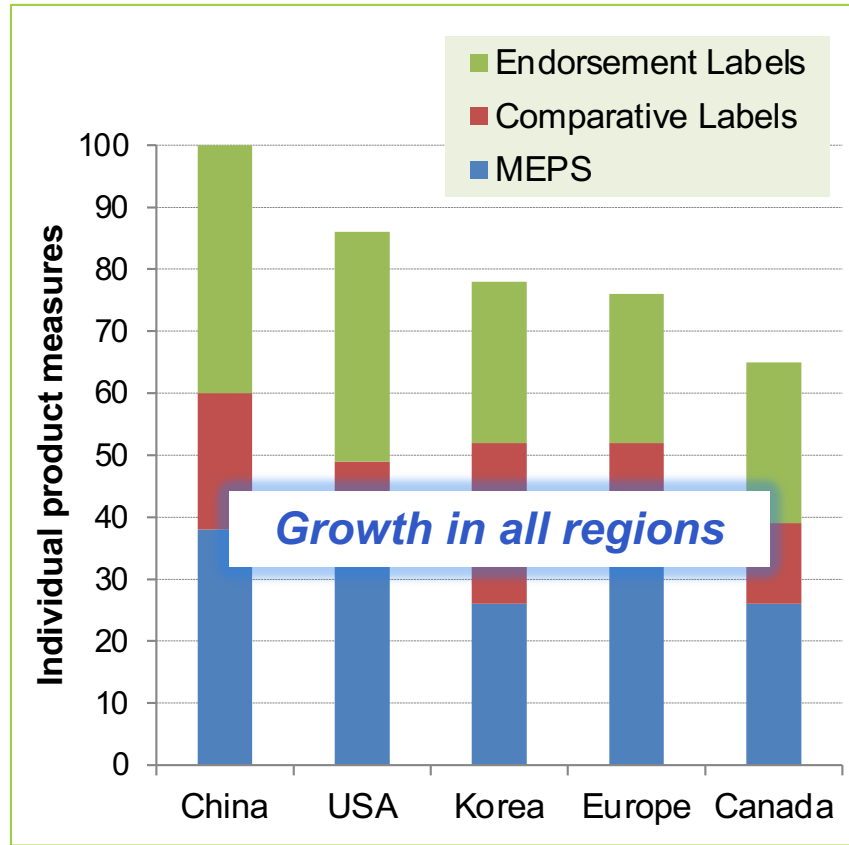
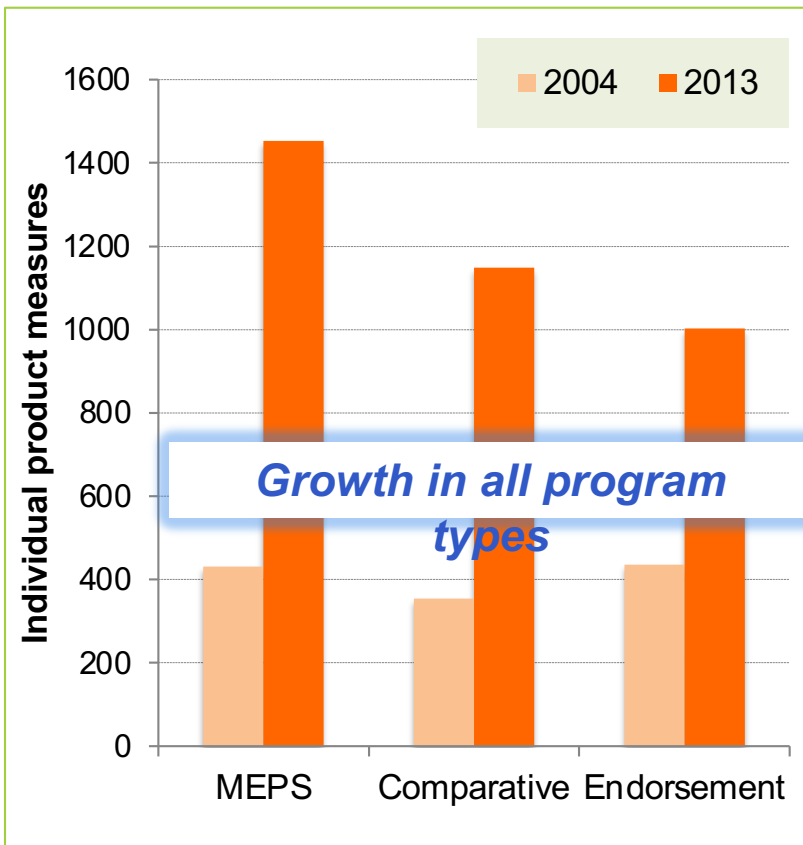
Source: IEA, Energy Efficiency Market Report, 2015

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Achievements of EESL programs

- This 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

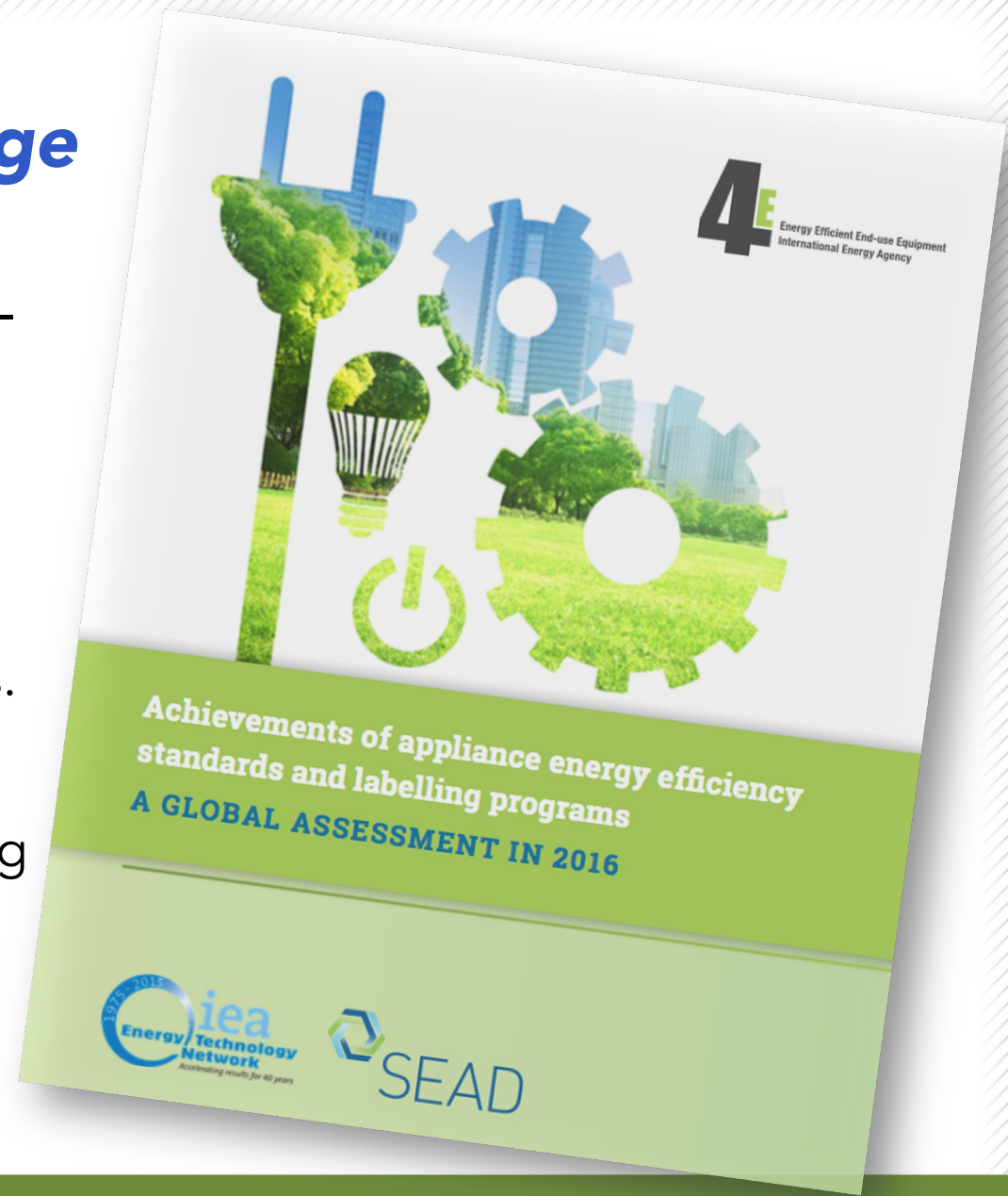


Source: Harrington, L., J. Brown, and M. Caithness, *Energy standards and labelling programs throughout the world in 2013, 2014, Energy Efficient Strategies*

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Report Coverage

- First published in 2015 - updated and expanded in 2016.
- Based on evidence published in over 150 detailed impact studies.
- Covers EESL programs in 50 countries spanning over 30 different product types.



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Findings: *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

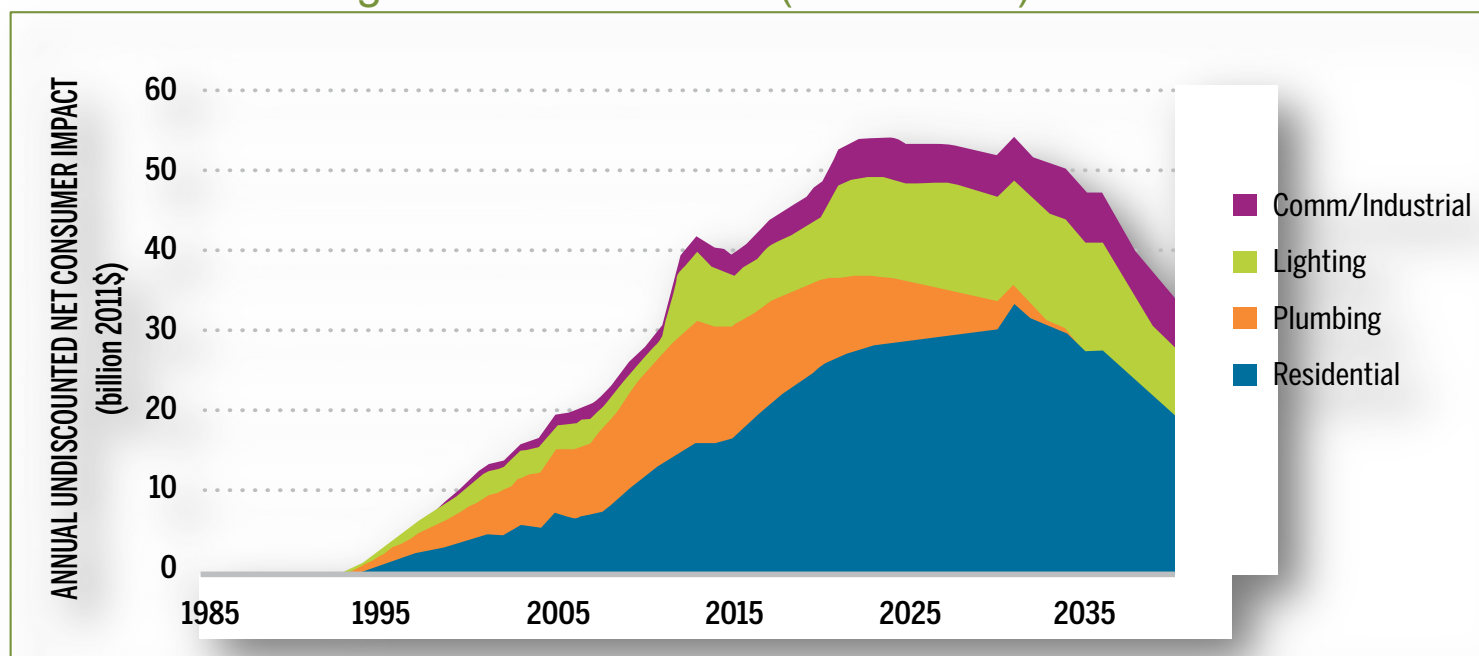
- The most mature national EESL programs covering a broad range of products are estimated to save between 10% and 25% of national or relevant sectoral energy consumption.

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Findings: 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)



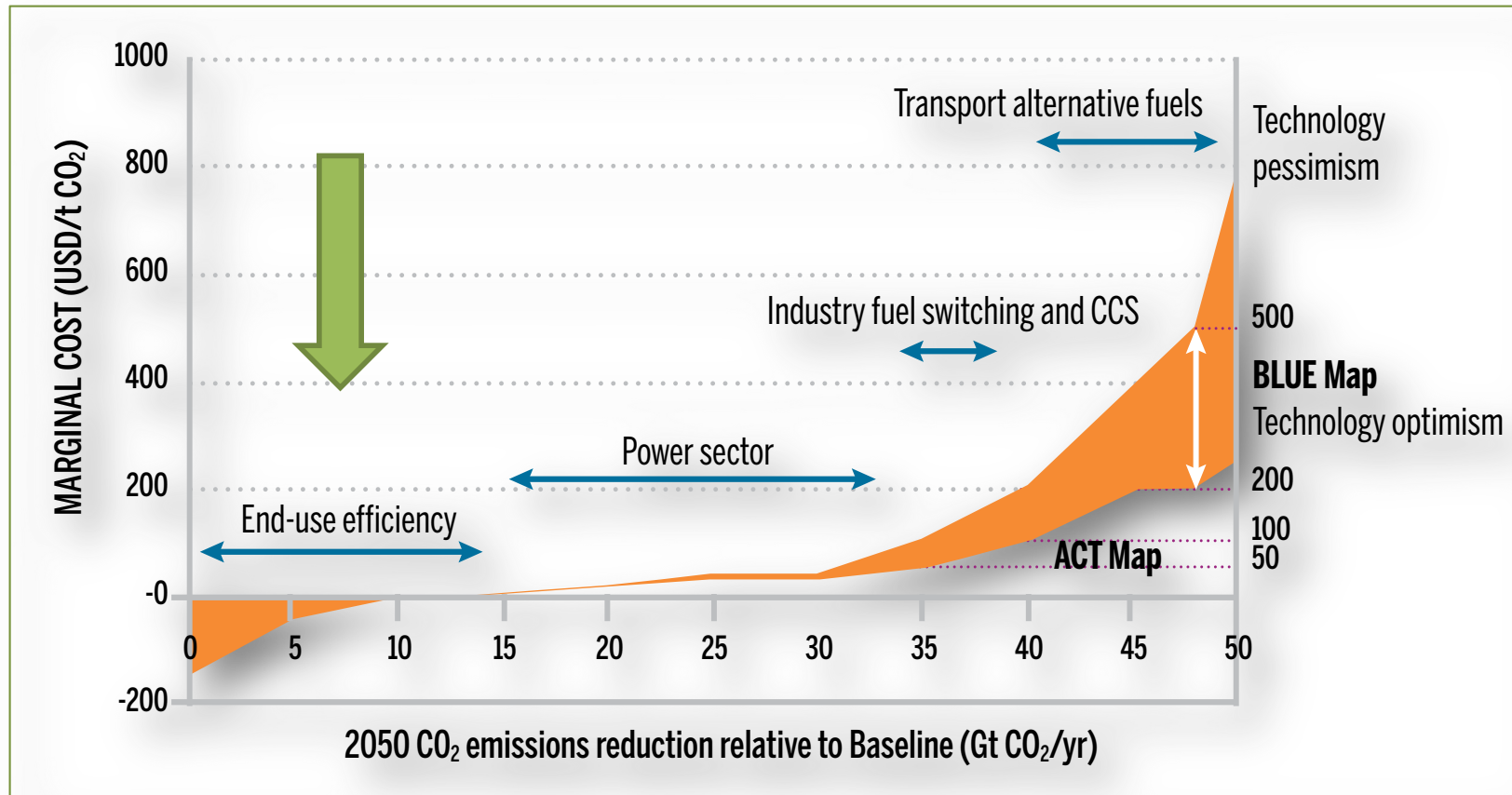
Source: Meyers, S., A. Williams, and P. Chan, *Energy and Economic Impacts of U.S. Federal Energy and Water Conservation Standards Adopted From 1987 Through 2013*, 2014, LBNL, USA: Berkely, California.

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Findings: Cost of Greenhouse Gas Reductions

- EESL programs deliver energy and CO₂ 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 CO₂ emission reductions.
- See following figure.

Marginal emission reduction costs for the global energy system, 2050



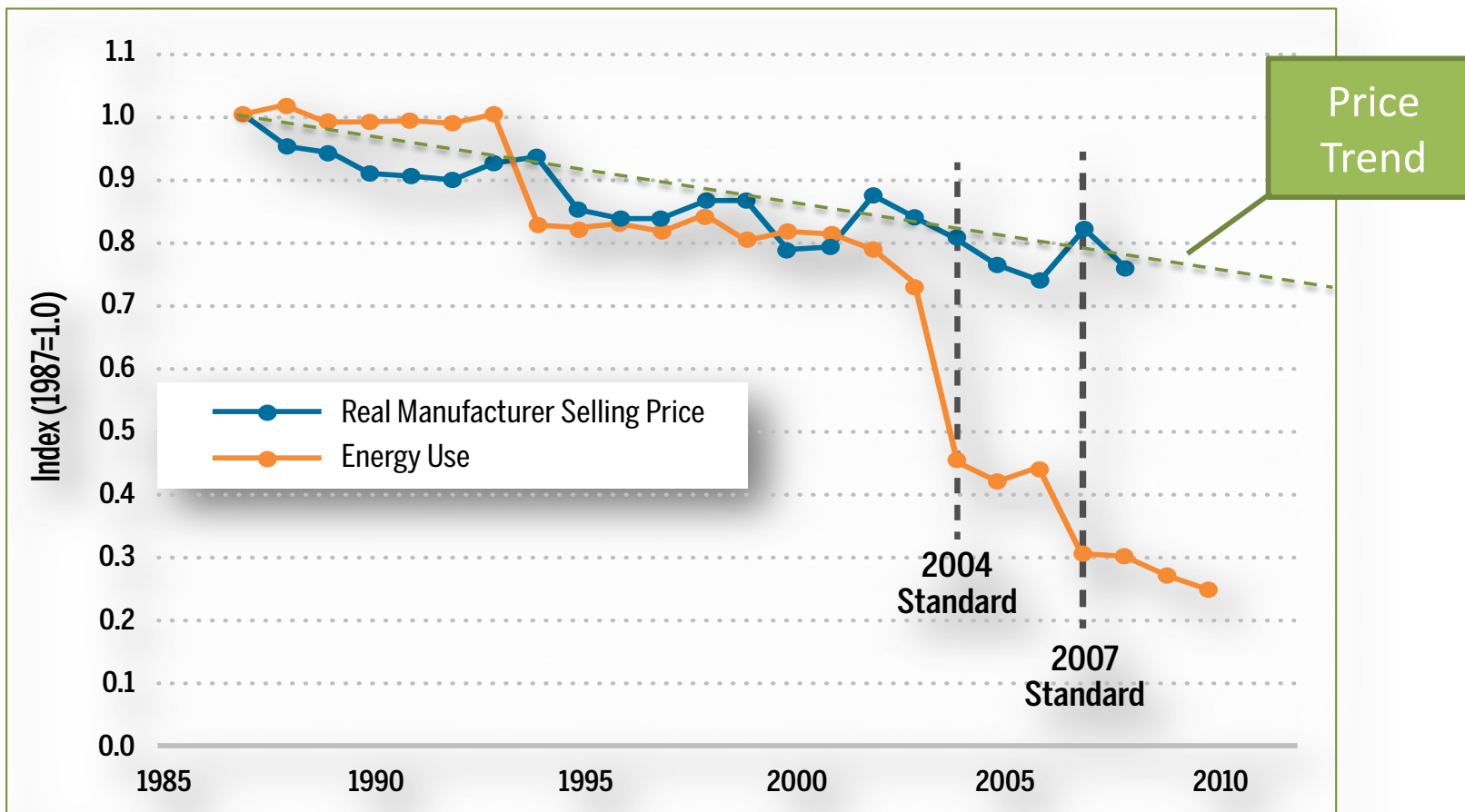
Source: IEA, *Energy Technology Perspectives: Scenarios and Strategies to 2050*, 2008, International Energy Agency/ OECD

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Findings: *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.
- Findings suggest that it is often 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

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Findings: *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 can be sufficiently large in their own right to justify EESL programs in some jurisdictions.

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Conclusions

- EESL programs have substantially reduced energy use and CO₂ 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 CO₂ savings.
- Governments should note these findings when determining investment options and priorities for meeting energy demand.

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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.

