



Savings and benefits of global regulations for energy efficient products

A 'cost of non-world' study

Executive Summary

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Summary

Key headlines:

THE POTENTIAL OF GLOBAL PRODUCT ENERGY EFFICIENCY REQUIREMENTS IN 2030

	7,600 TWh of global electricity savings, -13% compared to BAU		4,450 MtCO₂e of GHG emissions avoided, 7% of estimated 2030 emissions
	Equivalent to almost double the annual electricity consumption of the United States!		Equivalent to the emissions of 1,170 coal-fired power plants
	Worth an estimated €280-410 billion in energy savings		Or more than the entire GHG emissions of the EU in 2012!

With many other economic, trade, environmental, innovation and other benefits

Introduction

This study builds on previous work¹ which identified widespread and increasing global adoption of minimum energy performance standards (MEPS) and energy labels for products². These types of policies are now being employed for at least one product by more than 70 countries globally, covering countries constituting more than 90% of global GDP and 70% of global population. With the EU Ecodesign (MEPS) and Energy Labelling policies quite influential globally.

Organisations such as the IEA 4E (a dedicated international agreement on energy efficiency cooperation), CLASP (a dedicated international NGO) and the Super-Efficient Appliance Deployment (SEAD) initiative have created the beginnings of a more co-ordinated international approach in this area, progress remains at a relatively early stage. Nevertheless the limited existing research in the area also suggested huge potential for energy savings and other benefits, i.e. reduced emissions, financial savings, lower trade barriers; if further global alignment of product standards and efficiency requirements could be achieved.

¹ Notably the study 'Impacts of the EU's Ecodesign and Energy/Tyre labelling legislation on third jurisdictions' prepared for DG Energy by Ecofys, Waide Strategic Efficiency, ISR Coimbra University, Consumer Research Associates and Tait Consulting in April 2014, Available at https://ec.europa.eu/energy/sites/ener/files/documents/201404_ieel_third_jurisdictions.pdf

² Key product considered include residential and commercial appliances for lighting, space and water heating, white goods, ICT, Consumer electronics and Air conditioning equipment. Transport-related products and vehicles were not included in the analysis.

Thus, the key motivations for this study were to further quantify the huge potential savings (and avoided costs and wider impacts) from global harmonisation, and to refine understanding of the overall benefits (and costs) of greater global harmonisation.

Approach

The approach to this work was based on two key elements, (1) quantitative modelling of energy saving potential from global harmonisation; and (2) qualitative investigation and assessment of other impacts of global harmonisation.

The quantitative modelling was based on a hybrid model which combined detailed bottom-up data on product energy use and MEPS requirements gathered by the team, with top down energy use projections based on International Energy Agency (IEA) data. The model analysed more than 100 energy end-uses aggregated into relevant categories such as lighting, space cooling, motive power, etc.;. It considered applications across the residential, tertiary and industrial sectors and focused on a selection of key economies: China, the European Union, India, the Republic of South Africa (RSA) and the USA; therefore covering a high proportion (~65%) of total global GDP and population (~50%) and also a variety of different climates. The modelling exercise also included a 'Rest of the World' (RoW) grouping to capture all the world's energy use.

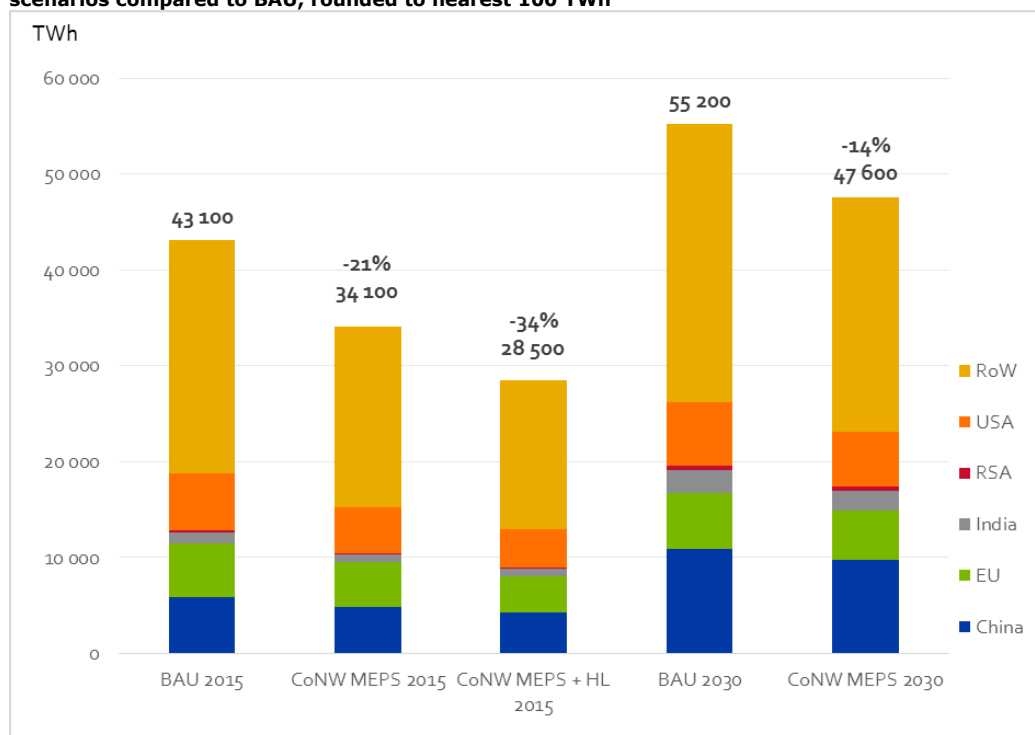
Three scenarios were modelled the most practical was the CoNW MEPS 2030 scenario which is the source of the main results presented below. It represents global adoption of product energy efficiency MEPS by 2020 at the current highest global MEPS level. This action was then dynamically modelled to 2030, simulating product stocks being replaced organically by new products compliant with the new requirements. It should be noted that this simulation may be rather conservative, particularly for the countries with already well developed MEPS and labelling schemes, as by 2030 products stocks in these markets are likely in reality to have developed significantly beyond the current highest MEPS levels.

This approach has a number of advantages and limitations, these are discussed in more detail in the main report. The most important thing to keep in mind is that the estimates, while not to be read precisely, can give a very useful insight into the scale of potential benefits and impacts.

Key findings

- **Significant global energy saving benefits can be achieved - for example 13% gross global energy savings in 2030:** if global MEPS were agreed at current most stringent levels and implemented by 2020 (see figure X1). Savings would be experienced across all countries and regions and across a large range of product groups.
 - Savings would remain significant even taking a likely rebound effect into account – estimated from literature review at 20%.
 - Consumer electronics and ICT, lighting and (thermal) heating and hot water products offer the highest relative and absolute energy saving potential.
 - If the highest current MEPS were already applied globally, then gross energy savings would be 21% or 34% if highest label requirements were also applied. This demonstrates that energy savings can be increased if alignment also included energy labels.

Figure X1: Summary of gross global final energy consumption and savings (%) of all modelled scenarios compared to BAU, rounded to nearest 100 TWh



- Reducing energy use would also have important GHG mitigation and environmental benefits:** these impacts would fall proportionally with the energy savings, i.e. 13-14% reductions in all impacts in the CoNW MEPS 2030 scenario. Benefits to global emissions are estimated at reduction of 4,450 MtCO₂e in this scenario, or 7% of 2030 total global BAU³ emissions. Important benefits to air quality (reduction in particulate emissions) and environmental quality (reduction in acidifying emissions) would also result from lower energy use.
- Improved efficiency would bring economic benefits to end-consumers and the wider economy:** this applies to end-consumers in the residential, tertiary and industrial sectors where products in these sectors are regulated. Economic benefits will arise from the increased consumption and production opportunities granted by energy savings and also the indirect economic impact of the savings being re-spent elsewhere in the wider economy. The benefits already take into account the additional costs of more efficient products, assessed to typically be no more than 25% of the value of the total energy savings. The value of potential energy savings are assessed to be €280-410 billion per year globally, or savings of 8-13% compared to a 2030 BAU, assuming today's energy prices.
 - Reduced energy use would result in structural economic change, reducing the relative size of the energy sector, while increasing the size of other sectors, including the appliance manufacturing industry.

³ BAU = Business as usual, i.e. continuing current trends, policies and practices

- Appliance manufacturers in the EU would be particularly likely to benefit from increased global energy efficiency requirements due to a leading position in energy efficiency.
- Trade impacts would also occur, with reductions in energy imports anticipated, particularly gas for heating and other fuels for electricity generation. This would be beneficial for the trade balances of net energy importers such as the EU, also contributing to increased energy security.
- Economic savings will also be experienced by implementing agencies and policymakers as costs and information are shared and inefficiencies and parallel or duplicate processes reduced.
- **Economic savings will have a positive net employment impact:** while jobs may be lost in the energy sector as energy consumption is reduced the re-spending of economic savings will create more jobs in other economic sectors. The balance of these changes is positive due to the relatively low labour requirement per unit of turnover of the energy sector in comparison to the wider economy. The global impact in the CoNW MEPS 2030 scenario is estimated to result in 1.7-2.5 million additional jobs compared to the 2030 BAU.
 - Changes in skills requirements will go hand-in-hand with the changes in employment. It is likely that some highly skilled jobs would be lost in the energy sector, with the new jobs being created having a broader range of skills needs, particularly in the services sector.
- **Harmonising requirements would reduce trade barriers:** which increasingly take the form of non-tariff or technical barriers, such as product standards and performance requirements including MEPS and labels. Reducing these barriers could be of particular benefit to EU firms which export these products. Negotiations at the WTO or on free trade agreements could already be used to start the harmonisation process. See Box X1 for an example of how these benefits may be experienced in practice.

Box X1: Hypothetical benefits of globally harmonised technical standards (entirely fictitious, but illustrating potential benefits)

At some point in the future.....Now that globally harmonised standards and MEPS are established, the (hypothetical) Amethyst Trading, manufacturer of electric refrigerators based in Mauritius, is making its export plans and finds that:

- A quick check of MEPS published in Canada against its own registered product performance data shows that its products can meet the necessary standards. The standards are almost completely comparable, once Amethyst's volumes in litres are converted to cubic feet as in Canada; and also the standards include conversion figures between an ambient operating temperature of 32°C, as used in Mauritius, and for 22°C as used in Canada.
- The certification body operating in sub-Saharan Africa, of which Amethyst is a member, has a reciprocal agreement with the body in Canada and so products can quote the Canadian endorsement in advertising their products and so quickly build customer trust in their products (standards are transparent between the two countries and posed no problem for comparison and the certification bodies have already established common verification procedures acceptable to both).
- Amethyst has invested in product testing for all of its main products, at considerable expense as there was no suitable test house in Mauritius itself, but the results are fully understood and recognised by their agents in Canada and no additional testing is required. This is saving Amethyst tens of thousands of dollars in testing per new target economy, compared with their attempts to export before harmonisation was secured.
- A competitor in the Australian market had challenged an Amethyst efficiency label claim, but check-testing by the Australians proved the label correct. That positive result is shared by enforcement authorities around the world and so the product's clean record is already on file in Canada.



- **Competitiveness impacts are relatively low and can be mitigated:** the impacts on manufacturing costs, compliance costs, product prices and markets are assessed to either be beneficial or generally low, although impacts differ within the various markets. Impacts are least for international Original Equipment Manufacturers (OEMs), but greater for large manufacturers and SMEs operating at a national level in previously unregulated markets, which will need to adjust to the new situation. To mitigate these issues it is crucial therefore that firms are given adequate time to adjust to any new harmonisation of requirements.
- **Harmonised requirements could positively influence investment in innovation, innovation speed and its focus on energy efficiency:** the extent to which these influences occur is a factor of the ambition (stringency) of the requirements. Although it is also important to strike a balance between stringency and competitiveness, as more stringent requirements are likely to require greater innovation efforts (reducing competitiveness), particularly from large manufacturers and SMEs operating at a national level in previously unregulated markets. A combination of MEPS and labelling can provide a good way to raise efficiency at the bottom of the market and incentivise innovation at the top.
- **Consumers will benefit from efficiency savings over time, although affordability may be an issue in some countries:** particularly where low energy prices, low usage and/or low incomes are present, as each of these act to reduce the financial savings from greater efficiency compared to the increased product cost. Nevertheless existing evidence finds that product price increases have actually been significantly lower than anticipated due to a variety of factors. Affordability impacts are therefore understood to be generally low, but could be mitigated by adopting a tiered approach to requirements (see below).
- **Product functionality can benefit from harmonised requirements:** for example increased efficiency can, in some cases, result in additional positive impacts on product usability, reliability and features. E.g. efficient power supplies that generate less heat (safer) and are smaller and weigh less (less materials used). At the same time requirements must be designed with sensitivity to regional or national needs for functionality and also to clearly communicate the benefits of any core changes in function to avoid consumer confusion and/or opposition.
- **Barriers to harmonisation exist but can be overcome:** this work identified three important types of barriers to harmonisation.
 - Regional barriers: based on real and perceived needs for differences between regions, stemming from differences in climate, culture and market structure, user needs, tangential regulations (such as food safety), simple historical accident and efforts to protect local markets.
 - Barriers to the process of change (harmonisation) itself: these include a lack of motivation to change, a lack of time and technical resources, uncertainties, costs of re-testing or developing new products, investment costs, update cycles being 'out of sync' between regions and disconnect between high-level policy and activities in technical committees where foundations must be laid for harmonisation.
 - Perceived barriers and risks: including potential damage to local industry from exposure to increased competition, the disappearance of familiar products, discontinuity of data as test methods change. Some issues seen as barriers are actually insignificant in practice: examples include language and units of measurement – translation for both is straight-forward and introduces little or no technical uncertainty.

In relation to barriers, aspiring for complete global harmonisation is neither realistic nor essential - a core requirement for harmonisation is simply the coherence and comparability of test standards and policy approaches, and the transparency necessary to identify and spread best practice standards and policies (including MEPS and energy labels).

It is clear that there are multiple overall benefits to global harmonisation of product MEPS (and energy labels), and barriers, while important, can be overcome. The benefits are experienced differently per country/region, depending on a variety of factors, including their starting point, energy consumption patterns, prices, climate, culture, energy system and industry. The EU is relatively well positioned to benefit from such changes, particularly its appliance manufacturing industries. Although EU benefits may be proportionally lower than other countries/regions, given its relatively high starting point, there still remain significant economic and environmental benefits that can be achieved, for example in helping to reduce the need for energy imports.

The scale of the benefits (and any costs) will vary with the stringency of any global requirements, therefore this question remains important. International agreement to implement MEPS at less stringent requirement levels may be easier, but will produce fewer benefits. Given the disparity in current requirements a tiered approach should be considered, e.g. offering variations in MEPS per region and that these are introduced over a reasonable timeframe, as this would help to overcome the concerns and barriers that remain.

In any case, this work has demonstrated the huge global potential benefits in energy use, GHG emissions, environmental impacts and economically from greater alignment to more stringent MEPS and energy labels for energy-related products. It is clear that further work in this area by the EU and other countries could be valuable in actually achieving these benefits.

It was not the purpose of this work to investigate how harmonisation could be achieved, but in broad terms the pathway to this should involve at least:

- Greater alignment of technical standards (test procedures, product groupings and efficiency metrics);
- More engagement in international dialogues and fora; and
- Capacity building in countries without existing standards and MEPS.