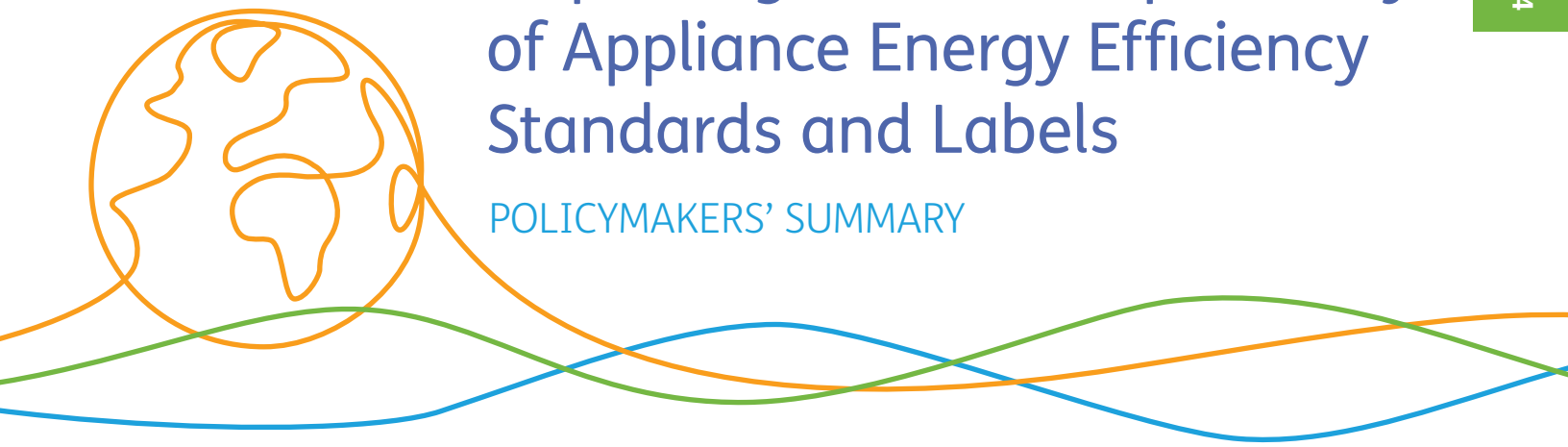
clasp

September 2014

Improving Global Comparability of Appliance Energy Efficiency Standards and Labels

POLICYMAKERS' SUMMARY

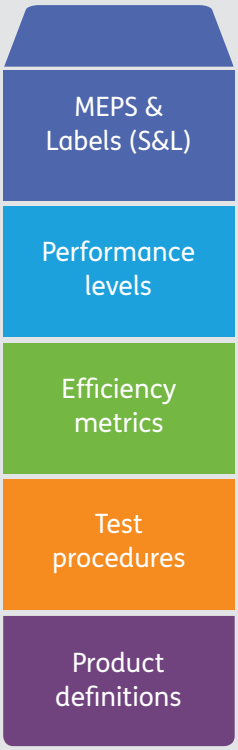


Comparing energy performance requirements for appliances from country to country is difficult because of variations in product definitions, misaligned energy test procedures, and divergent efficiency metrics. This complex landscape can prevent policymakers from identifying or adopting global best practices in appliance energy efficiency policy.

To address this challenge, CLASP and The Policy Partners, along with many other technical product experts, collected data to compare appliance energy efficiency policies, test methods, and efficiency metrics for more than 100 products across nine economies—Australia, China, the European Union, India, Indonesia, Mexico, Russia, South Africa, and the United States.

The resulting analysis represents the largest and most comprehensive comparison of energy standards and labels ever compiled. It describes which product policies are comparable across economies; which are not; and which could be. It is intended to provide policymakers and experts with useful tools for analyzing country data at a macro-level and to enable more informed decisions about the most appropriate policies.

Analyses completed in collaboration with The Policy Partners



S&L REGULATIONS specify MEPS and label requirements for a product incorporating all components described below.

ENERGY PERFORMANCE LEVELS are thresholds that a product's efficiency metric must meet in order to qualify for a certain label or comply with a regulation.

EFFICIENCY METRICS define how the results of a test procedure are translated into an energy performance indicator.

TEST PROCEDURES describe how the energy consumption of a product within a specific product definition should be determined.

PRODUCT DEFINITIONS define what is included in regulations for a specific product.

KEY OBSERVATIONS

Energy performance regulations are built on a series of interconnected parts, each defining one building block for energy performance requirements and energy labels, and each one affecting the comparability of these policies. The table reads from the bottom up, reflecting that the regulations that are most visible build on underlying, less visible parts.

There are several key observations from the analysis:

- **Data is not always accessible** about S&L performance levels and the test procedures and efficiency metrics underpinning these, even to professionals active in the field.
- **Efficiency metrics are as important as test procedures** in alignment of S&L, yet receive virtually no international attention.
- **Product definitions and the scope of regulations and requirements are equally important** for aligning S&L and also often overlooked.
- **S&L components are less aligned when further along in the S&L development process.** Test procedures are an earlier stage and are most aligned, followed by efficiency metrics, and MEPS and highest label threshold levels are least aligned.
- **The number of products covered by S&L has grown substantially in recent years.** The EU Ecodesign program is now covering more products and has more ambitious performance requirements, for MEPS and energy labels, than any other program included in this analysis.

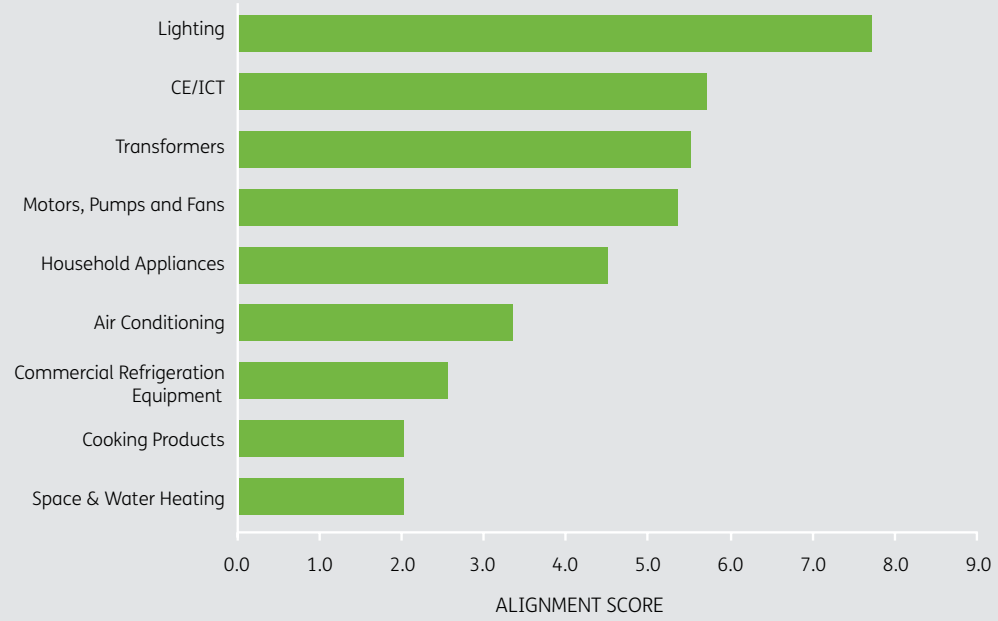
ALIGNMENT BY PRODUCT

International efforts over the past years, including via the SEAD Initiative and IEC and ISO work, have focused largely on improving the alignment of existing test procedures and developing new test procedures.

Comparatively little work on the development of common energy efficiency metrics has been done, although regulators have sometimes aligned these without specific international efforts. Some test procedures, such as the one for electric motors, have developed to include efficiency metrics and a scale of product energy efficiency levels or tiers within the international test procedure. More commonly, however, efficiency metrics are developed separately within each economy, even if the test procedure is aligned internationally.

Figure PS-1 shows the level of alignment in each product area, comparing the number of aligned test procedures and efficiency metrics with the total number of products and the total number of regulated products in each area.

Figure PS-1. **Alignment of test procedures and efficiency metrics by product area**



Differences in the level of alignment between product areas at least partially reflect the level to which products themselves are internationally comparable.

- Products that are globally traded and the same all over the world have higher alignment scores: *lighting, consumer electronics (CE)/information and communication technology (ICT), transformers,* and *motors*.
- Products with lower alignment scores often have larger regional differences in their design, usage, and characteristics: *air conditioners, cooking products, and space and water heating products*.
- In the middle of the spectrum, *household appliances* can be fairly easily converted among different regulations: These products have larger regional differences but a long history of energy performance regulation, so the impact of different regulations on their performance is by now better known.

ALIGNMENT BY ECONOMY

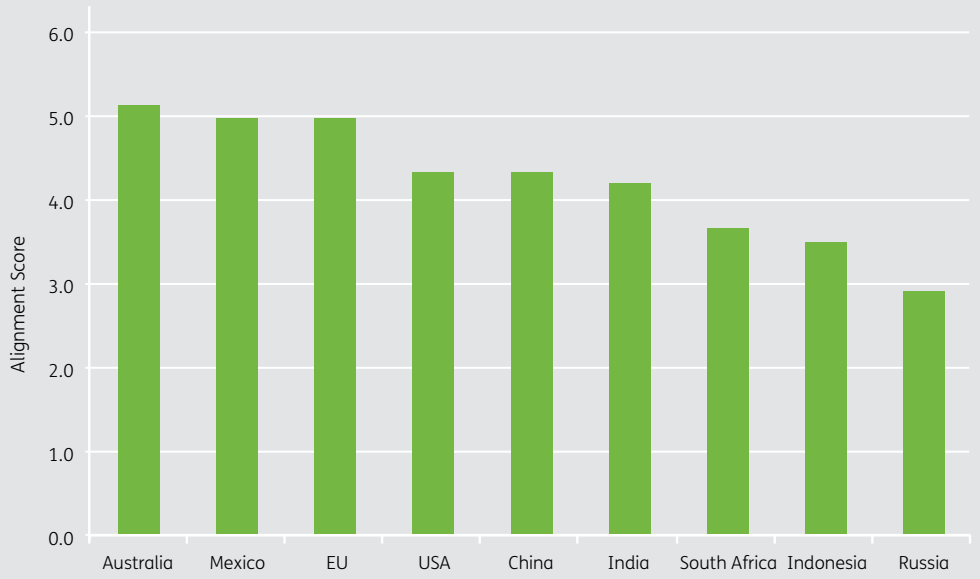
Figure PS-2 illustrates to what extent economies have aligned their regulations (MEPS and labels).

Alignment of test procedures and efficiency metrics varies between countries. Weighted by the number of regulations in place, Australia, Mexico and the EU show the highest levels of alignment within the economies included in this study. The US, China and India all show a similar slightly lower level of international alignment.

For Australia and Mexico, high alignment scores seem to be the result of a deliberate policy choice: in Australia's case, to align with the most appropriate international standard for its economy; in Mexico's case, to mainly copy (sometimes older) US regulations. The EU typically tackles products that have not previously been regulated else-

Products with lower alignment scores often have larger regional differences in their design, usage, and characteristics.

Figure PS-2. **Alignment of test procedures and efficiency metrics by economy**



where, thus setting an international benchmark for testing and evaluating efficiency for those products that is later adopted by other economies. A similar process applies to the US, although probably more limited to ICT products, for which US ENERGY STAR specifications seem to set the example for how to measure and rank energy performance.

Low alignment scores seem to be associated with uncertainty about S&L policies. Russia's low ranking is largely explained by the confusing state of its S&L, with many outdated Soviet-era standards in place with unclear legal status, and many new regulations possibly, but not certainly, in the process of being aligned with primarily EU requirements. Indonesia's and South Africa's scores are influenced by most of their S&L being under development and uncertainty about which test procedures and efficiency metrics will be applied.

In all economies, less than half of all regulations are fully aligned internationally. Australia, with its policy of international alignment, shows fully aligned test procedures and efficiency metrics for 14 of its 36 regulated products (included in this analysis), and Mexico, with its policy to align with the US, for 9 out of 22 analyzed regulations.

All economies, with the exception of Mexico, show more alignment in test procedures than in efficiency metrics. Whereas international test procedures often seem to provide a suitable way of measuring energy consumption under standardized conditions, efficiency metrics are more often adapted, probably to reflect different national circumstances such as climatic conditions or usage patterns.

Although there seems to be a movement towards using internationally aligned test procedures in all economies, efficiency metrics seem to be drifting further apart. For example, many economies are switching the metric for air conditioners from energy efficiency ratios (EERs) to seasonal energy efficiency ratios (SEERs). This incorporation of climatic conditions (which vary globally) appears to be leading to a divergence in S&L, despite convergence to a single internationally agreed test procedure.

Table PS-1. **Products covered by S&L (MEPS and/or labels) by economy for all products analyzed**

COUNTRY	MEPS	Labels	MEPS or Labels
US	47	40	70
European Union	62	35	67
China (PRC)	39	42	51
Australia	35	18	41
Mexico	23	23	33
India	5	14	16
Russia	8	9	14
Indonesia	7	8	10
South Africa	2	8	9
TOTAL:	**228**	**197**	**311**

WHO'S AHEAD IN S&L DEVELOPMENT?

PRODUCT COVERAGE

The EU and the US are clearly ahead in regulating energy-using products (of the economies and products included in this analysis) with 67 and 70 products regulated, respectively.[1] Perhaps surprisingly, the EU leads in the number of MEPS, with regulations for 62 products, whereas the US has more energy labels than the EU. This is a reversal of earlier years in which the EU relied more on energy labels and the US relied more on MEPS. It should be noted that most US labels are ENERGY STAR endorsement labels, whereas most EU labels are categorical energy labels, China leads in the number of energy labels in place, with 42 products labeled. Table PS-1 presents an overview of S&L identified per economy.

S&L AMBITION LEVELS

The ambition level of MEPS and labels could only be compared with some reliability for 25% (18 out of 72) of the products covered in the analysis, across household appliances, lighting products, some CE/ICT products, some air conditioning products, and motors.

Across these comparable products, the EU stands out as the clear leader in S&L development. The EU has by far the largest number of MEPS as well as the most ambitious MEPS and energy labels for more than half the comparable S&L. Table PS-2 shows the number of most ambitious S&L for each economy (including those where the lead is shared with other economies), as well as the number of unique most ambitious S&L (where the lead belongs to that economy alone).[2]

The number of products covered by S&L has grown substantially in recent years. The main driver for this has been the extension of scope and ambition level of several S&L programs. The EU Ecodesign program is now covering more products and often has more ambitious performance requirements, for MEPS and labels, than any other program.

1 Situation by mid-2013; since, several countries have adopted new regulations.
2 Comparisons like these should be treated with caution. For example, if products are only labeled in one economy, those will not show up in a comparison between economies.

Table PS-2. **Most ambitious S&L identified by economy for all comparable products**

COUNTRY	MOST AMBITIOUS		UNIQUE MOST AMBITIOUS	
	MEPS	High Label	MEPS	High Label
European Union	9	9	8	8
Australia	3	5	2	3
U.S.	5	1	5	-
China (PRC)	2	3	1	1
Mexico	2	2	1	-
India	-	1	-	-
Indonesia	-	-	-	-
Russia	-	-	-	-
South Africa	-	-	-	-

Note: In some instances, more countries share a "most ambitious" MEPS or High Label. As a result, the sum of MEPS and High Labels across countries is not identical to the total number of MEPS and High Labels that can be compared: those totals are 18 comparable MEPS and 15 comparable High Labels.

The EU Ecodesign program is now covering more products and often has more ambitious performance requirements, for MEPS and labels, than any other program.

There are some important differences among economies that contribute to variations in policy coverage and stringency. For example, substantial differences in energy prices, product ownership, and product usage patterns lead to different economic assessments from country to country.

POTENTIAL FOR TEST PROCEDURE AND EFFICIENCY METRICS ALIGNMENT

The analysis shows a wide range of alignment for test procedures and efficiency metrics in place: a few products have fully aligned test procedures and efficiency metrics, even including aligned efficiency levels (such as electric motors) or aligned labels (such as some ICT products). Most products, however, have virtually no alignment of test procedures.

For all products, there is some potential for harmonization, although in some cases that seems limited to components of test procedures. For many heating and cooling products, for example, it may be possible to define common tests of product components or modes of operation; such an approach has recently been used successfully for ISO standards for pump systems. In other cases, such as household refrigerators, fully aligned test procedures seem to be achievable.

Efficiency metrics, however, appear to be much harder to align than test procedures. Alignment of efficiency metrics first requires that test procedures are aligned. In addition, local usage characteristics must be similar enough for a single efficiency metric to acceptably describe what constitutes energy performance for a product globally.

In many cases, alignment of efficiency metrics may even be decreasing. A good example of this is in air conditioning, where virtually all economies have aligned to the same international test procedure for testing product performance, but then use quite different efficiency metrics to assess energy performance. In addition to counteracting the progress being made via test procedures

Table PS-3. **Alignment potential per product**

	Possible for test procedure components	Possible for full test procedure	Possible for test procedure & efficiency metrics	Test procedure already aligned, possible for efficiency metrics	Test procedure & efficiency metrics already aligned	Test procedure, efficiency metrics & ranking already aligned	Test procedure, efficiency metrics, ranking & label already aligned
Household Appliances	■	■					
Lighting			■	■			
CE/ICT	■			■			■
Air Conditioning	■	■					
Space & Water Heating	■	■	■				
Commercial Refrigeration Equipment	■	■	■				
Cooking	■	■					
Motors, Pumps & Fans		■	■	■		■	
Distribution Transformers				■			

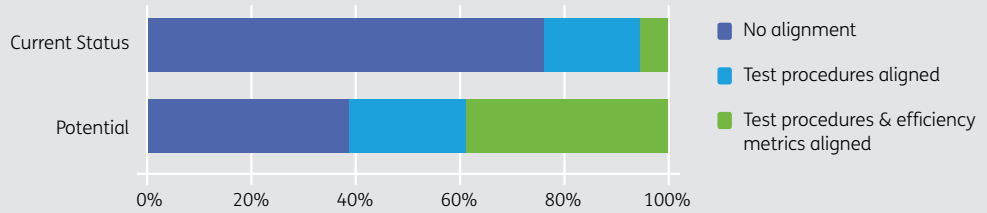
for improving product comparability, this also creates a barrier for the transfer of energy-efficient technologies between economies with different metrics. It is important to recognize, however, that locally tailored efficiency metrics can be important to ensure that MEPS and energy labels are representative of actual usage in an economy.

Test procedures and efficiency metrics alignment can be complicated by existing national procedures and metrics. Many product designs are tailored to national procedures and metrics, in which case a switch to a different test procedure or efficiency metric may result in substantial shifts in the energy efficiency rankings of existing products in an economy. In addition, existing national test procedures and efficiency metrics may reflect product designs that differ substantially between economies (as is the case for many heating products), or be representative of specific local usage patterns or climatic conditions not found elsewhere (as, for example, for many cooking products). A case-by-case assessment is needed to determine the expected benefits and the potential for the development of internationally aligned test procedures and efficiency metrics.

Table PS-3 presents the assessment of alignment potential per product for the 8 product areas covered in this analysis. The best potential for alignment of test procedures and efficiency metrics appears to be in the lighting products, CE/ICT, and motors, pumps and fans areas, and the best potential for test procedure only alignment is in the household appliances and cooking products areas.

As Figure PS-3 shows, less than 25% of the 72 products analyzed have aligned test procedures today, and only 4 products have aligned efficiency metrics. There is the potential for over 60% of products to have aligned test procedures, with almost 40% having the potential for aligned efficiency metrics.

Figure PS-3. **Potential for alignment of test procedures and efficiency metrics**



FUTURE RESEARCH DIRECTIONS

Several future analyses could build off this analysis of product data and assessment of comparability across economies. In consultation with policymakers, to ensure that future research is of maximum use, CLASP is considering the following lines of research:

- **Develop targeted energy savings potentials analyses** from the adoption of more ambitious policies in specific countries for high-interest comparable products.
- **Assess the costs and benefits** of filling gaps in policy coverage and increasing policy stringency across several economies for high-interest comparable products.
- **Conduct a more detailed assessment of opportunities** to increase the alignment of international test methods for high-interest products.
- **Analyze the costs of having non-aligned test methods** to industry and governments for one or more high-interest products.

ADDITIONAL RESOURCES

Product-specific information about comparability of definitions, test procedures, and efficiency metrics is available on www.clasponline.org:

- **THE FULL REPORT** contains high-level product-specific information
- **ANNEX 1: OVERVIEW TABLE** contains quantitative information for all products
- **ANNEX 2: PRODUCT FACT SHEETS** contains additional product-by-product detail
- **WEBINAR MATERIALS** provide additional context from the report authors

In addition, CLASP's Global S&L Database, a searchable database of MEPS and labels, is available at: www.clasponline.org/SLdatabase

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