

Mapping & Benchmarking of distribution transformers



The IEA's 4E Mapping and Benchmarking Annex provides policy makers with evidence-based comparisons of the performance of products sold in various national markets. This allows benchmarking of the success of national policies in managing product energy consumption and efficiency and enables identification of opportunities to further encourage the uptake of energy efficient products.

This briefing describes an international comparison of the energy efficiency of distribution transformers and associated policies which was carried out by IEA 4E in close cooperation with the transformers working group of the Super-efficient Equipment and Appliance Deployment (SEAD) initiative. It draws on data for over 14,000 transformer models from Australia, Canada, India, the Republic of Korea and the USA, and the policies in these markets as well as those in Japan and the EU.

Observations for Policy Makers

- **This IEA 4E analysis confirms that the five tiers of the 'international ladder of performance'** for transformers, as proposed under the SEAD initiative in 2013, provide guidance on appropriate levels of ambition suitable for different markets and policy measures.
- **Minimum Energy Performance Standards (MEPS) appear effective** at eliminating the poorer performing products but all markets have access to highly efficient models.
- **Of the participating countries, MEPS are in force in Australia, Canada (dry-type only), Republic of Korea and USA.** The Republic of Korea and India have a mandatory energy labelling scheme. MEPS are due to take effect in the EU from 2015. Japan has a relevant TOP RUNNER category. In India, electrical utilities are obliged to use only transformers with a 3-star rating or higher. Country-specific observations include:
 - Whilst many Korean models match the very best in the USA, Australia and Canada, the 2012 MEPS in Korea are significantly less stringent than others for liquid-filled and marginally so for dry-type (these standards are already under review).
 - EU requirements coming into force in 2015 place weaker requirements on lower capacity transformers than all other participating economies.
 - For liquid-filled 3-phase transformers, the relatively stringent USA MEPS ensure their models are confined to the top end of the efficiency range.
 - Canada is the only participating country without regulatory MEPS for liquid-filled transformers (although these are addressed via a voluntary code of practice), and India does not cover dry-type nor larger liquid-filled (a review of the policy is underway at the time of writing).

More Information

All publicly available Annex mapping and benchmarking outputs are available on the Annex website at <http://mappingandbenchmarking.iea-4e.org>.

For further information email: contact@mapping.iea-4e.org

Key Findings

Comparing efficiency of models and local policy level for 3-phase liquid-filled transformers

The USA has the highest efficiency levels across the range of capacity (kVA) ratings, with Australia having a similar spread of efficiency. The Republic of Korea has by far the widest range and has significant potential to introduce more stringent MEPS.

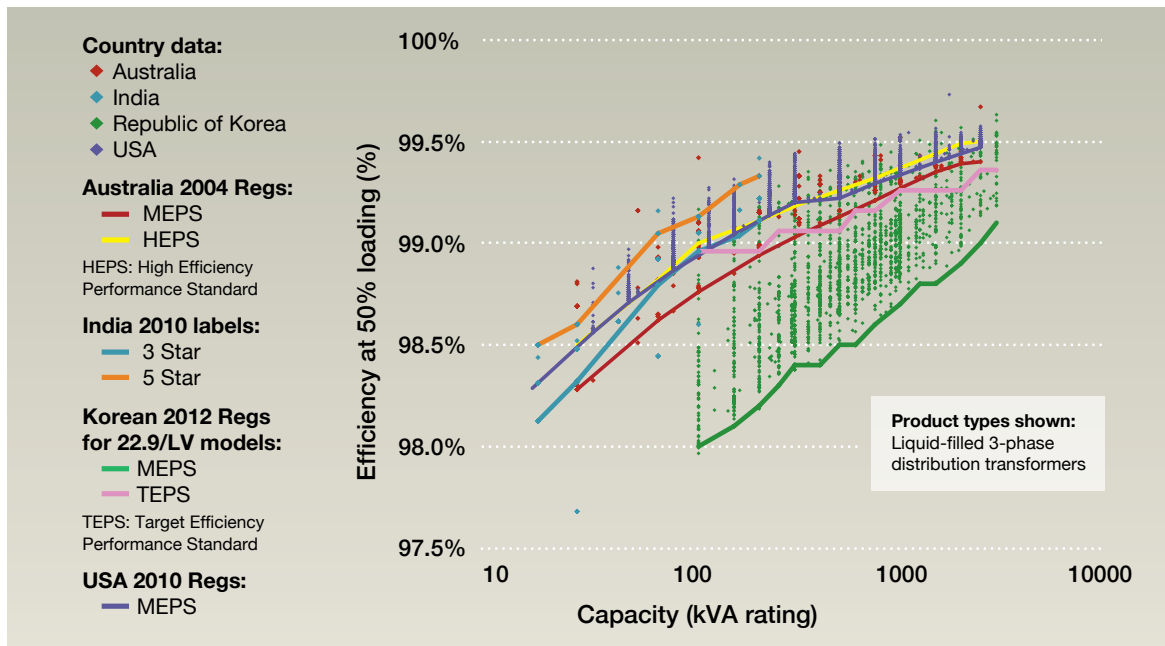


Figure 1. Scatter graph of liquid-filled, 3-phase transformer performance with MEPS levels as at February 2014, normalised to IEC capacity measurement.

Comparing current and future policy requirements for 3-phase liquid-filled transformers

The EU proposed MEPS for 2021 (3-phase, liquid-filled, Figure 2) are topped only by the Indian 5-star requirements above 50 kVA capacity; but for capacities below that, the proposed 2015 EU MEPS are by far the least stringent of the countries studied. The USA MEPS levels of 2016 are amongst the most stringent of those analysed for all major types of transformer.

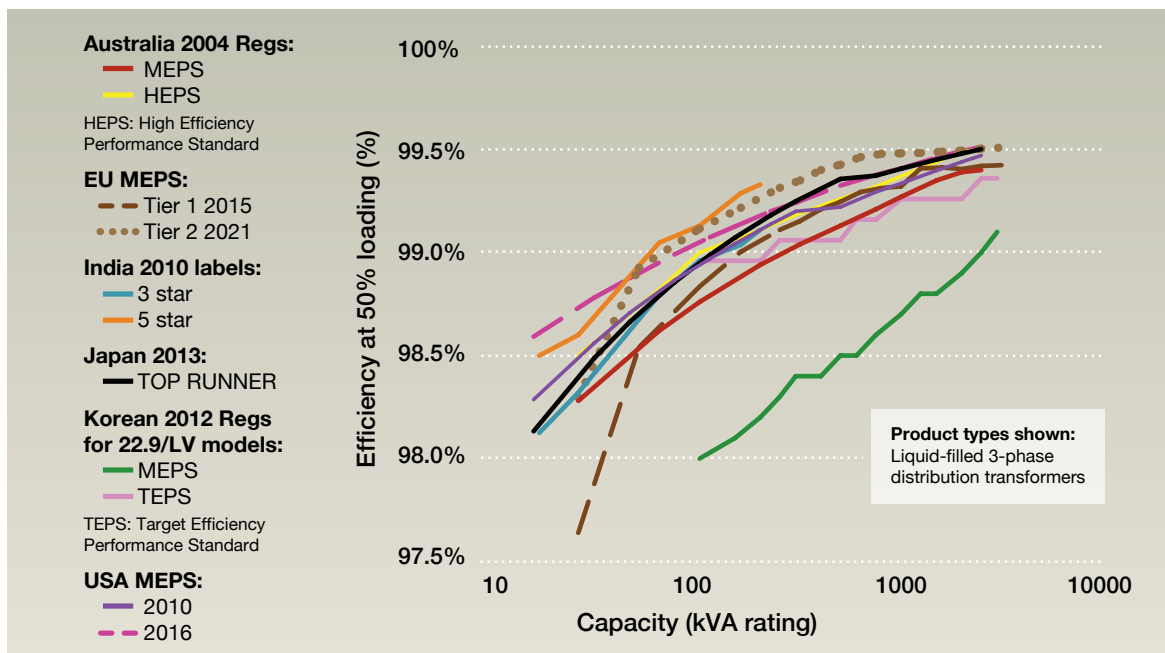


Figure 2. Mandatory MEPS levels for 3-phase liquid-filled distribution transformers (also includes 3-star and 5-star Indian energy label performance levels for comparison, EU and Japan standards). Normalised to IEC capacity measurement.

This policy brief is based on a full report published in April 2014. Data quality varies between countries and graphs. See full report for details. The IEA Implementing Agreement on Efficient Electrical End Use Equipment has made its best endeavours to ensure the accuracy and reliability of the data used herein, however makes no warranties as to the accuracy of data herein nor accepts any liability for any action taken or decision made based on the contents of this report.