Policy Maker Summary

APEC – CAST Project:

Internationally Aligned Test Methods and Performance Requirements for TVs

The Internationally Aligned Test Methods and Performance Requirements for TVs report presents results of an analysis undertaken in 2014 to evaluate the global differences between i) test methodologies used to measure the energy performance of televisions and ii) energy performance policy requirements for televisions. The study has a particular focus on SEAD and APEC economies[1]. Opportunities are identified to work toward greater international harmonisation on testing and policy approaches. These include suggested refinements to test methods for greater affordability and repeatability, and a proposed policy foundation of internationally-aligned efficiency reference thresholds on which regulations and labels could be built.

Findings from comparing test methods for televisions

A total of 6 test methods for televisions were examined in detail. The comparison between the test methods found that the largest differences between test methodologies exist between the largest markets most active in policy development, EU, USA and China. The exception to this is Australia, which was the first region to regulate TVs in 2009, and to use the maximum luminance ratio approach in their policy (see Report 4 for details).

There are two main standards for televisions that are relevant to international harmonisation efforts:

- IEC 62087, which addresses on mode testing of TVs and has a major rewrite in the process of being finalised in 2014 - The findings of this project are relevant to the subsequent revision.
- GB 24850-2013, which is the testing method used in China.

Key findings from comparing test methods

The following key findings were drawn from the comparative analysis:

- **Test methods need constant evolution:** TV test methods need to be constantly evolving due to the rapid rate of TV technology development, to ensure the testing results are representative of actual in-home energy consumption – for example, to account for increasingly sophisticated picture optimisation algorithms and automatic brightness control functionality. For this reason, refinements have been suggested to the video signal used during TV testing (the 'dynamic broadcast-content video signal'), which is currently well harmonised across the globe.
- **Sample preparation is key:** TV sample preparation (luminance configuration) is the biggest disruptive influence on comparability of energy test results, and normalisation approaches are unlikely to be sufficiently robust to enable the results of tests carried out in many international regions (using IEC 62087) to be compared with tests carried out in China (GB 24850-2013).
- **Policy requirements add testing divergence:** Policy approaches can introduce additional variance in the application of testing approaches in some countries. Key areas for harmonisation in policy relating to testing approaches include: i) standardisation on the illuminance levels used for ABC testing, ii) incentives for ABC, and iii) harmonised approaches to peak luminance levels in policy.

[1] These countries include, but are not limited to Australia, China, India, Japan, Korea, the Philippines, the United States, and Vietnam, plus, although not part of APEC, the European Union.

Harmonisation progress to date

The comparison between the test methods found that there is a good alignment on measuring equipment requirements, the broadcast content test video signal, and confidence level requirements for measurement of uncertainty. There are a number of small variations that are often compatible and even necessary, e.g. different testing temperature ranges or input voltage variations. These are minor concerns but may have a small impact when comparing test results between regions. High priority issues for harmonisation are summarised in the table below:

Aspect of test method	Magnitude of impact
Luminance testing and measurement for on mode testing	L
Identifying ABC sensor location	L
Impact of TV stands in low illuminance on-mode-with-ABC testing	L
Sample preparation - inputs (RF vs HDMI)	L
Definitions and calculations relating to uncertainties	L
Equipment - Light source colour temperature and directionality	M
Test video signals for new formats (UHD and 3D)	M
Illuminance levels and calculations for on mode testing with ABC	H
TV sample preparation for on mode testing (luminance setting)	H
Dynamic broadcast-content video signal (need for revision)	H

Exploration of underlying reasons for divergence in test approaches

In some cases, aspects of test approaches are not harmonised simply because they had yet to be addressed within an international standards process. In other cases, different approaches are used due where technical studies in these countries have support their respective approaches. Laboratory set up between countries is relatively consistent and therefore regional variations in test approaches are not likely to be due to testing laboratory facilities. Where variation occurs in a lab-by-lab basis, it is usually down to a training issue that has resulted in misinterpretation of a test standard.

Some variations in test standards may be due to cultural differences – for example due to digital switch over timing or consumer attitudes toward default product settings. In practical terms, the opportunity to change or adjust existing test methods is constrained by a number of factors including:

- Timing of regional revision cycles for test methods in relation to activities of other regions.
- Variations in regional priorities for test method application.
- The lack of a formal mechanism for closer alignment between regions.
- The creation of uncertainty while new test methods are under development.
- The cost to industry and end-users from testing products according to a new method.
- Industry concern that changes in procedures may impact the availability and cost of products.
- The loss of insights gained from accumulated data according to a particular test methodology.
- Local technology availability, for example a greater prevalence of the use of RF inputs in China.

Toward greater test method harmonisation

One of the most beneficial developments in the test standards area would be the potential shift to a light source such as a projector, which (accompanied by appropriate test material) would allow for simplified and more robust setting of illuminance and reduce the severity of many of the other testing issues identified.

Above all, greater harmonisation of test approaches between Chinese and IEC approaches (principally in terms of screen luminance levels) is essential in order to allow future comparisons between China and other regions. There is no sufficiently robust current method to translate the results of individual tests between the two test approaches to be compared.

It is recommended that SEAD generate further discussion on the proposals put forward in the full report and gain consensus on the way forward through active dissemination of this report to those within international, regional and national standardisation organisations concerned with televisions. SEAD could engage with relevant television test standard staff and committees particularly in China to make them aware of the report findings.

Findings from comparing performance requirements for televisions

Policies in a total of 13 regions were analysed, including over 70 performance thresholds from those regions. This revealed a startling array of different thresholds in use, despite televisions being very similar in technology the world over.

Relative stringency of requirements

Regulatory requirements (MEPS) tend to be set at a power demand three or four times lower than the best models on the market, but the wide range of efficiency allows significant scope for them to be tightened whilst retaining a wide consumer choice. Ambition of energy labels is essential in the fast improving TV market, but often lacking. The highest efficiency classes in some areas coincide with the most stringent MEPS in others, and high proportions of products are quickly able to populate these classes. Some regions lose a number of efficiency classes from their label scheme due to local MEPS being specified higher up the labelling scale.

The baseload power allowance is the component in formula to calculate TV energy efficiency that accounts for the power demand necessary to drive the electrical circuitry regardless of the screen size. A higher baseload allowance generally enables more small TVs to meet the criteria. A careful choice of baseload allowance is necessary to ensure that appropriate proportions of smaller TVs are able to meet requirements. This is especially important where policies reduce the baseload power proportionally with the classes. The policy threshold lines that have the best market distribution involve i) reasonably flat curved thresholds (based on technically relevant and easy to use formula), ii) fixed baseload allowances that don't reduce as thresholds become more stringent.

Exploration of underlying reasons for divergence of policy

A considerable global variation in TV energy efficiency policy has been identified. There are many underlying reasons for differences in the level of ambition between EU, US, Australia, Singapore and others such as Korea, Vietnam, Malaysia. These include:

- **Resources:** Limited budgets available to assess the market and develop requirements.
- **Policy and market evidence:** Insights available to policy-makers at time of setting policies.
- **Regional politics:** Due to i) the prioritisation of energy efficiency concerns by government, ii) the broader policy framework – for example, what policies can be applied and the number of levels in an energy label, iii) any political influence of local manufacturers resistant to change.
- **Policy schedules / revision cycles:** Policies tend to become more ambitious over time, in line with the increasing efficiency of new TVs. If some regions do not update their requirements on a frequent basis they are likely to have

less influence on the market. In addition, if policy schedules do not align with other global policy timings, inconsistent interim approaches may be adopted in order to meet deadlines.

- **Product mix and cost concerns:** There may be a reluctance to revise requirements toward greater stringency due to assumptions that this may impact product availability and cost.

Towards greater policy harmonisation

This study proposes a series of benchmark performance levels that policy-makers can use as a foundation for setting their own local policies and label schemes – called reference thresholds (RTs). The reasonably flat curved thresholds were chosen (based upon a hyperbolic tangent / "tanh" approach used in the ENERGY STAR TVs draft Version 7 equation) to mimic the average performance curves for current and emerging technologies. The five classes of reference threshold provide an 'international ladder of performance', ranging from minimum requirements for a current average global market (class RT1) up to incentive performance levels for 2018 (class RT5). Labels and MEPS can be set at levels suitable for local economics and product availability, but if they are based around these reference thresholds, they will be globally coherent and easier and more cost-effective to enforce - benefitting both manufacturers and policy-makers.

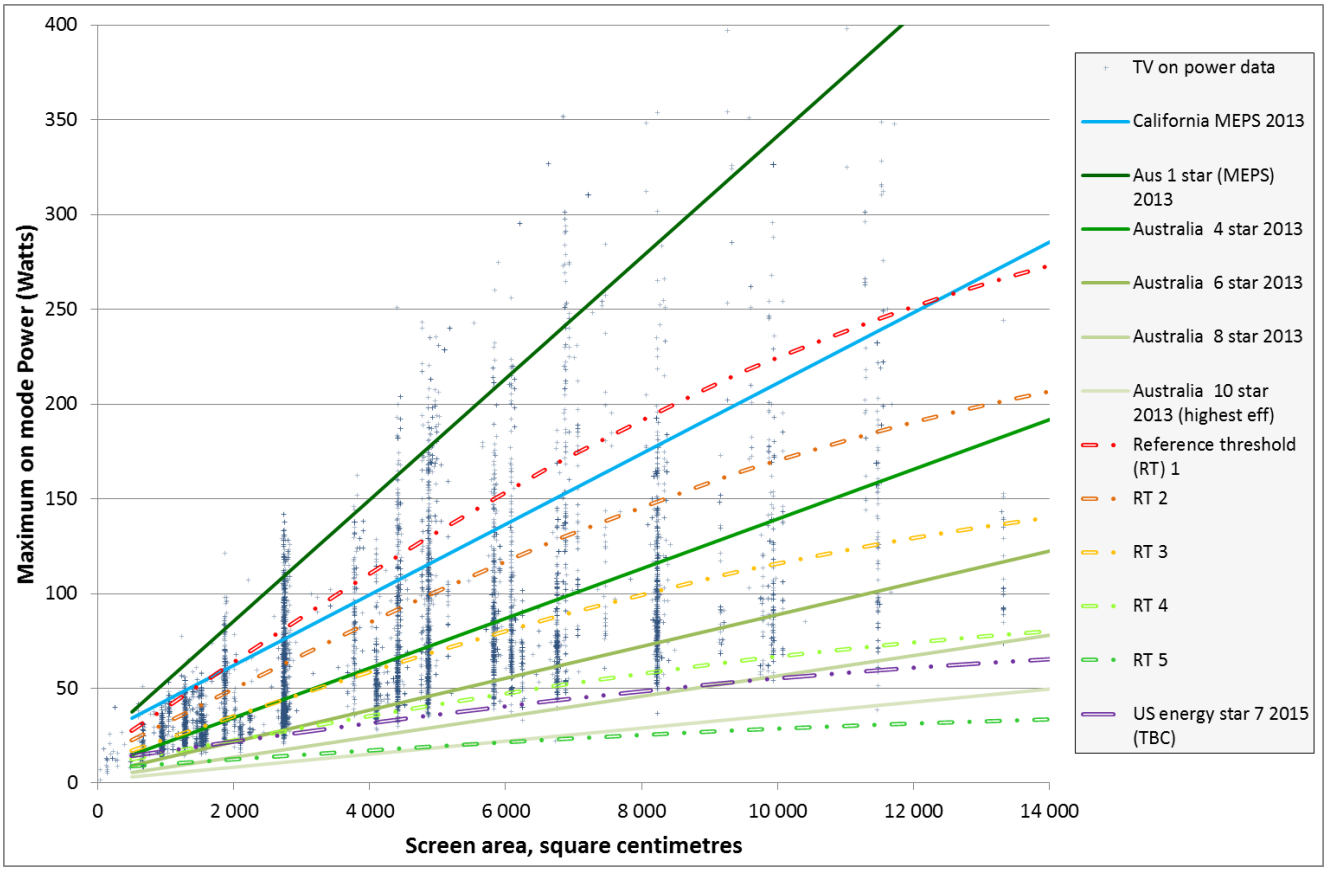

Figure S1: Proposed globally relevant reference thresholds (RT) for policy-makers – RT1 (least stringent) to RT5 most stringent), as compared with selected policy thresholds from Australia and the USA (California).

The thresholds are screen-size and technology neutral. Since there is no significant change in TV service or functionality as the screen technology changes, policies should not in principle discriminate by technology, otherwise they run the risk of restricting innovation or even in promoting the deployment of less efficient technologies. There are no allowances for the

number of tuners or for additional functionality such as hard drives, as such ancillary functionality is not considered a core part of the TV service.

The data basis for the reference thresholds is mainly from Australia and USA, and whilst representing a wide range of efficiencies, it may not provide an accurate representation of all markets. Therefore, when applying the reference thresholds to different regions, the variability of product mix and power demand by region needs to be taken into account. It is possible to adjust all the factors in the proposed formula. In particular, if a starting MEPS is being considered in a country where there has been no previous TV policy activity, a less stringent line might be more appropriate. In order to account for market differences, at a basic level, policy makers could compare national average television consumption or efficiency data with the thresholds. Ideally a more detailed analysis would be undertaken to gather data on the current and pre-market models of regional brands and superimpose the reference thresholds over these data sets. Reference threshold parameters could then be adjusted, if necessary, for a fit that ensures an appropriate minimum coverage of these brands for the policy type.

The ideal approach to TV policy would be a foundation global MEPS at the RT1 level. It is possible that some locally adjusted less stringent standards may be justified in the short term if legacy product is necessary for economic reasons or where there are significant differences in market composition and regional manufacturers. However, with regard to newly manufactured products, the goal of MEPS for all TVs should be to set these at global stringency, and with appropriate policy signalling (including APEC government support of manufacture of efficient TV technologies), models produced locally to developing markets should all be able to meet the global MEPS.

As a support to harmonisation efforts, guidelines are recommended that could assist policy makers in initiatives to achieve cost effective efficiency improvements in televisions – for example providing:

- Information on policy cost and potential savings to support a shift toward specification of a highest energy efficiency level that is feasible but not expected to occur in the absence of further policy action.
- Steps to apply the Reference Threshold approach in their region, supported by the provision of electronic tools and training.

The television area is exceptional in that global harmonisation of test methodologies, and even performance levels, could be made a reality within a few years. It is hoped that this study provides a foundation to bring about this global shift.

Australian Government
Department of Industry and Science
Intertek
clasp

This Report was prepared by Intertek, with support from CLASP. The project was funded by the Australian Government, with support from the SEAD initiative.