



TESTING FOR QUALITY

Benchmarking Energy-Saving Lamps in Asia



EXECUTIVE SUMMARY

OVERVIEW

National and local efforts to promote lighting energy efficiency have been gathering strength in Asia. Many of these programs feature the compact fluorescent lamp (CFL), as adoption of CFLs is one of the quickest and easiest means of delivering energy conservation in the residential and commercial sectors. More than forty countries, many of them in Asia, have announced plans to phase out the use of incandescent lamps as part of their efforts to address climate change, with the CFL being promoted as a replacement.

The increasing focus on CFLs has significantly accelerated the global demand for the lamps. Worldwide CFL production has increased six-fold in the last decade, from 500 million lamps in 2000 to more than 3 billion lamps in 2008.² This is expected to accelerate, as the phaseout of incandescent lamps could boost demand of CFLs to as many as 10 billion units per year.³

Countries in Asia face serious challenges when it comes to adoption of CFLs, including purchase cost, sub-standard

quality, a lack of common standards for CFLs, and a lack of consumer awareness about CFL quality. In addition, although CFLs are being sold across Asia, the lack of a common standard makes it difficult for data sharing across the region, or establishment of a regional testing program. Since CFLs are being promoted as a direct replacement for incandescent lamps, CFLs that do not outperform incandescent lamps can result in serious consumer dissatisfaction with the product category as a whole. Thus, the terms “low-quality,” “lower-quality,” “sub-standard,” “poor,” or “shoddy” are now being used by experts, program managers, and regulators to describe the poor-performing CFLs that are being produced in large quantities and sold in many markets in the Asia region.

PURPOSE AND SCOPE OF THIS REPORT

In order to assess and address these CFL product quality and standards harmonization issues, the ECO-Asia Clean Development and Climate Program (ECO-Asia) partnered with the Australian Department of Environment, Water, Heritage and the Arts (DEWHA) in 2008 under the aegis of the Asia-Pacific Partnership

¹ *Phasing in Quality: Harmonization of CFLs to Help Asia Address Climate Change*. USAID Asia, March 2009.

² Chen, Yansheng. China Association of Lighting Industry, 2008.

³ *Global Lighting: Phase Out of Incandescent Lamps*. Project Identification Form under the GEF Trust Fund for the Global Environment Facility, July 2007.

on Clean Development and Climate (APP) to initiate a substantial regional CFL quality and performance benchmark testing program. The primary objectives of this CFL benchmark testing program were:

- To assess the overall quality of CFLs currently being sold in various Asian markets.
- To assess the opportunities for harmonization of CFL standards based on test results.
- To gain insight into the possibility of implementing a regional product testing program and its complexity.
- To make a first-order examination of lamp mercury content.

THE TEST PROCESS AND RESULTS

Sample CFLs were purchased from stores in six countries – Australia, India, Indonesia, the Philippines, Thailand, and Vietnam. Australian lamps were purchased by DEWHA staff, and lamps in India, Indonesia, Philippines, Thailand, and Vietnam were purchased by ECO-Asia staff using a common, consistent procurement methodology. Overall, more than 2,600 samples were collected representing 160 models (the performance results below represent results from 137

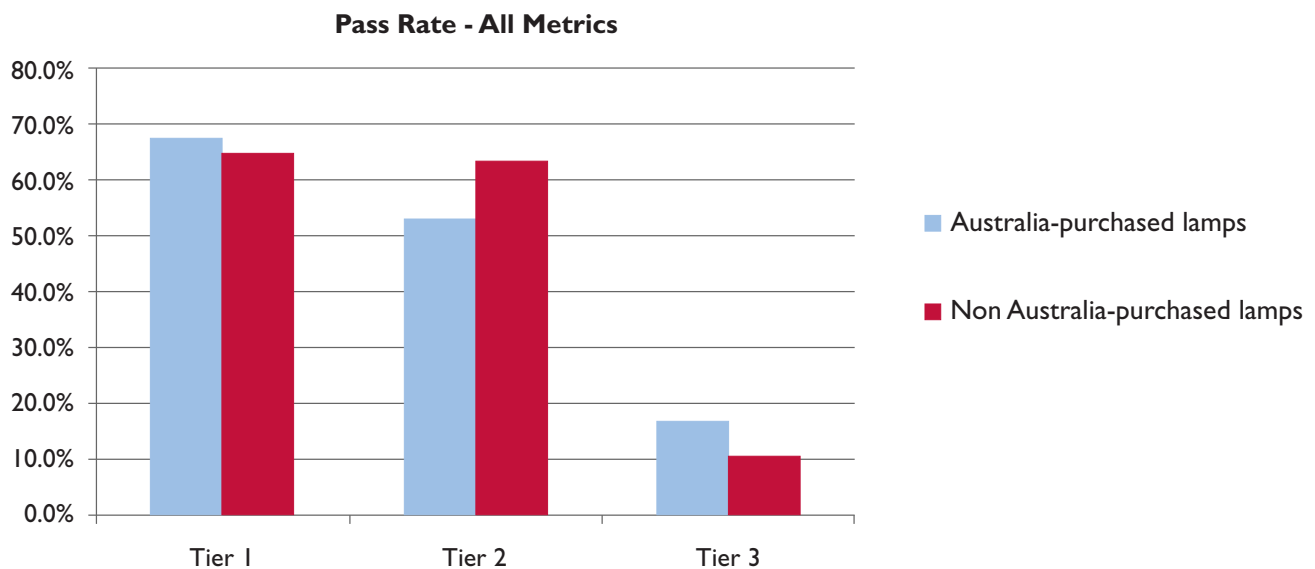
models).⁴ The results presented focus on the following five metrics:⁵

- Efficacy
- Survival Rate
- Lumen Maintenance
- Power factor
- Color Rendering Index (CRI)

Along with the discussion of the numerical results of these five key metrics, these results were compared to the three quality tiers of the Asia Lighting Compact:⁶ Tier 1, which is equivalent to China’s minimum performance standards and represents “good” quality; Tier 2, which is harmonized with the standard of the Efficient Lighting Initiative (ELI) and represents “better” quality; and Tier 3, which is equivalent to the quality standard for European lamps, the United Kingdom’s Energy Saving Trust and represents “the best” quality. **Figure 1** shows that only two of three lamps tested (66%) can meet the Tier 1 standard, and just 58% of lamps meet the Tier 2 standard.

A subset of the lamp models was tested for their mercury content, and the results from a total of 43 randomly selected models from the six countries are

Figure 1. Overall CFL Performance Versus Established Quality Standards.

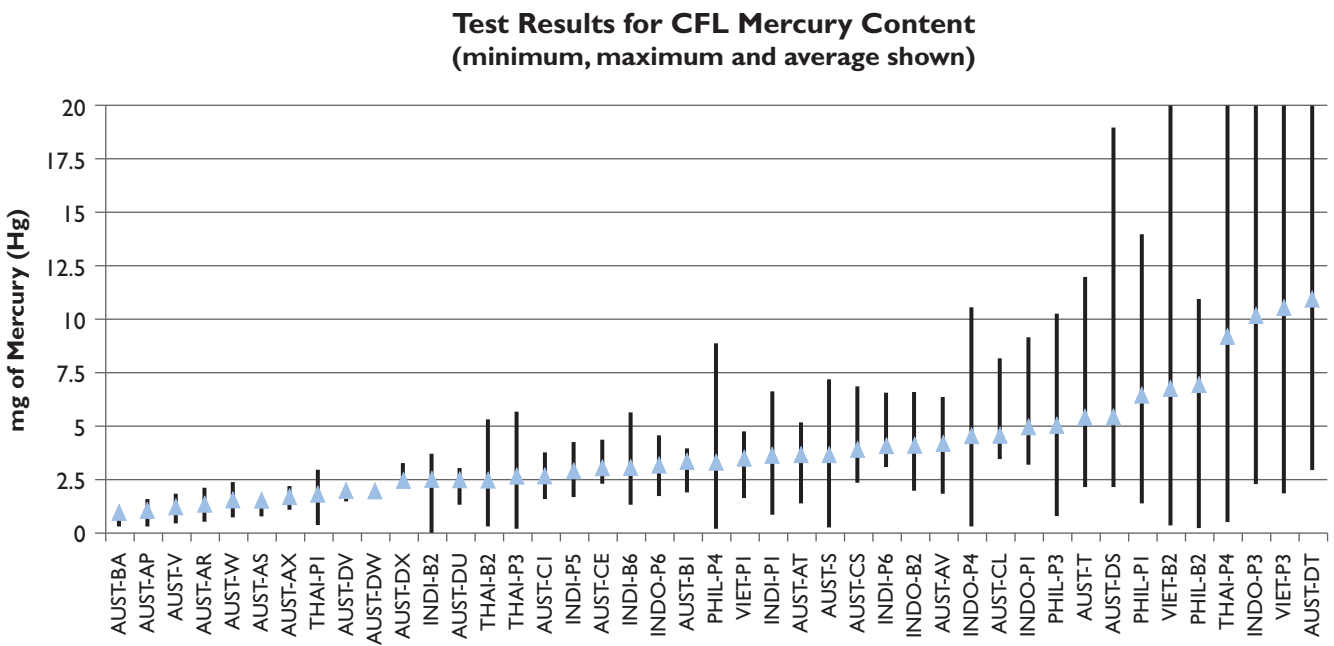


⁴ Additional and supplementary analyses on the test data have been carried out by DEWHA. The methodology and results from these further investigations are available online, and will be available as DEWHA reports separately in 2010.

⁵ Tested in accordance with IEC 60969 Ed. 1.3 b:2009. *Self-ballasted lamps for general lighting services – Performance requirements.*

⁶ The Asia Lighting Compact (ALC) is a non-profit public-private partnership that works to improve the quality of lighting products and encourage the adoption of energy-efficient lighting in Asia. The ALC was formed in October 2009 with members including national lighting associations in Asia, international lighting manufacturers, and government agencies.

Figure 2. CFL Mercury Content Test Results



presented above in **Figure 2**. The results showed that at least 25% of the lamps have average mercury content of more than 5 mg, and lamps with higher average mercury content are present in all markets.⁷ Furthermore, when the mercury content of lamps is considered against the lamp costs, some of the lower-priced lamps also have much higher mercury content relative to lamps with higher costs or from more well-known manufacturers.

CONCLUSIONS AND RECOMMENDATIONS

The following are some of the main conclusions that can be drawn from the results of this benchmark testing effort:

- At least one-third of the sample failed to meet what may be considered as minimum performance standards (or the criteria for what may be considered a “quality” lamp) for the region.⁸
- The overall failure rate is likely to be significantly higher than presented here due to limitations in laboratory testing, and that only a subset of all required

metrics defining a quality CFL was evaluated.

- At least 90% of tested products do not meet the requirements for ALC Tier 3, or European equivalent standards.
- Name-brand models generally performed better than low-priced models in most cases against most metrics. Exceptions to this rule were noted.

With the formation of the Asia Lighting Compact (ALC) and the release of the ALC’s CFL Quality Guidelines, which present a comprehensive set of CFL quality criteria developed based upon internationally accepted standards, there is now a set of quality standards that could be recognized and applied across the region. The ALC along with other actors in Asia can and need to work together, in order to scale up the discussions of CFL promotion to the international level and to forge an agreement on common solutions, before a combination of policy missteps and consumer backlash limit the potential expansion of the regional and global CFL market. In addition, regional measures specific to CFL testing and market monitoring are presented below.

⁷ 5 mg is the maximum level being set for the US and European markets by various organizations.

⁸ Note: “Failure” as used in this context, indicates that the average of results from the tested samples of a particular CFL model does not meet a defined performance level (i.e., for efficacy, power factor or CRI), rather than a physical or mechanical failure that renders the lamp inoperative. This applies to all parameters evaluated except for the survivability test results, which indicate actual lamp failures.

- A regional agreement on a common test procedure, a data-sharing plan, and ways to mutually recognize test results across nations is urgently needed among standards and enforcement agencies.
- There is a pressing need for a uniform, recurring, regional, process to test and assure the quality of CFLs sold in the region. Such regular efforts can serve to inform policy makers on the state of the market, and also to insure the integrity of programs to promote CFLs.
- Government agencies, the private sector (including manufacturers and retailers of CFLs), and non-governmental organizations (NGOs) in the region should take concrete actions to increase user awareness of high-quality CFL products and ways to identify them, and support independent actions such as the ALC to ensure quality products are available for all of Asia.
- A number of countries in the region need technical assistance in setting up the infrastructure (testing facility, development of standards, training of laboratory personnel, etc.) to certify the performance of CFLs to a common, regional level, as well as in recycling CFLs and dealing with end-of-life issues, including mercury content and safe lamp disposal.⁹
- More testing is recommended to corroborate these initial findings. This would be particularly useful in CFL models intended for the very large and quickly growing Chinese market. Regulators and program managers would be well-served by an on-going, regular, regional testing regime.
- As about half of the lamp models tested have at least one or more samples with more than 5 mg of mercury. The issue of mercury content and dosing control in lamps as well as test methodologies, merit a second, focused round of testing efforts that can cover more of the regional markets, and may also help to inform mercury recycling and educational programs.
- The value of a robust, harmonized set of quality standards for the region cannot be understated. With such a mechanism, well-performing products could be identified independently, allowing purchasers to select products based on value (price) while being assured of at least a minimum level of performance.

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United States Agency for International Development

Regional Development Mission for Asia, Athenee Tower, 25th Floor,
63 Wireless Road, Lumpini, Patumwan, Bangkok 10330 Thailand

⁹ One example of this technical assistance is the need for facilities to conduct CRI testing of lamps in India.