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Harmonization of CFLs to Help Asia Address Climate Change

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This report follows up on a regional benchmarking review of compact fluorescent lamps (CFLs) that was commissioned by the Australian Greenhouse Office (AGO) in 2006 to support the International CFL Harmonization Initiative. The AGO report was updated through a series of interviews and surveys carried out by a team of national consultants working for USAID's ECO-Asia CDCP. These national consultants included Mr. Steven Zeng (China); Dr. Ranjan Bose (India); Mr. Bernard Castermans (Indonesia); Ms. Flordeliza Andres and Ms. Laurie Navarro (Philippines); Mr. Monthon Kumpengsath (Thailand); and Ms. Vu Thi Kim Thoa (Vietnam).

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EXECUTIVE SUMMARY

Recent national and local efforts to promote energy efficiency have been gathering strength in Asia and around the globe. Many of these programs feature the compact fluorescent lamp (CFL) as a mainstay in delivering energy conservation in the residential sector. The increasing focus on this robust energy-efficiency measure has significantly accelerated the global demand for CFLs. Indeed, world-wide CFL production has seen a dramatic increase, reaching more than 1 billion units per year earlier this decade, and now exceeding 2 billion units annually. If the current trend continues, global CFL production stands to reach, if not exceed, 4 billion units annually before the end of this decade, and plans to phase out incandescent lamps may cause CFL production to increase to as many as 10 billion units.[1]

This report provides an overview of CFL markets[2] and programs in China, India, and the four largest ASEAN nations – Indonesia, Philippines, Thailand, and Vietnam. As part of this overview, the report assesses the quality of CFLs currently available in regional markets. The report also proposes an immediate and intensive coordination of existing regional CFL initiatives in order to support development of a broad-based quality assurance process for CFLs in Asia.

The three main challenges that the countries and the Asia region as a whole are facing are sub-standard CFL quality; a lack of common product quality standards for CFLs; and a lack of consumer awareness regarding CFL quality. 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 region.[3]

Unfortunately, as is discussed in this report, there is no commonly used regional or international standard for CFL quality and performance. Therefore, CFLs need to be assessed in relation to national standards and guidelines or to manufacturers' advertised claims. *Generally speaking, a poor-quality CFL is a lamp that burns out faster, or gives off less light, than advertised, or than prescribed by national standards and guidelines.*

The findings in this regional analysis suggest that the total market share of low-quality CFLs produced in Asia – those for which there is no evidence of product testing and registration, and/or which have a rated lifetime of less than 6,000 hours – averages close to 50 percent of the market. *This means that Asian consumers have a 50-50 chance of selecting a sub-standard CFL.*

In addition, due to the fact that there is no commonly used quality guideline in the region today, manufacturers lack a sufficient incentive to produce high quality CFLs, and consumers gravitate toward cheaper, lower-quality products. Currently, there are a total of 41 different national standards and labelling schemes for CFLs in place or under consideration worldwide. For manufacturers who export to more than one country, compliance with all of these different CFL programs and schemes can increase product costs and may negate pricing efficiency gains from volume production. The cost of

1 "Global Lighting: Phase Out Incandescent Lamps." Project Identification Form under the GEF Trust Fund for the Global Environment Facility. 15 July 2007.

2 This report only addresses the market for "self-ballasted" CFLs, which comprise the vast majority of CFLs sold in the Asia region. It does not cover the market for "pin-based" CFLs, which have a separate ballast.

3 This is not an abstract concern: an extensive market failure of CFLs occurred in the U.S. during the early 1990s. As a result of the negative consumer backlash from the proliferation of poor-quality CFLs, it took many years for consumers to regain confidence in CFLs as a quality lighting product. The lessons learned from the U.S. experience are documented in a report by the Pacific Northwest National Laboratory (2006).

complying with testing and certification requirements (usually in the range of a few percent of production costs) can rise to as high as 4 to 5 percent.

Given the globalized nature of the CFL market, a concerted, regional approach to addressing these market challenges is appropriate and necessary. The strategies to harmonize product requirements, increase the level of consumer awareness, and achieve CFL quality assurance are not new, and a number of them have been successfully implemented elsewhere. However, in developing Asia, the market size, geographic and economic settings, and the number and levels of government agencies involved can present significant challenges to a regional harmonization effort.

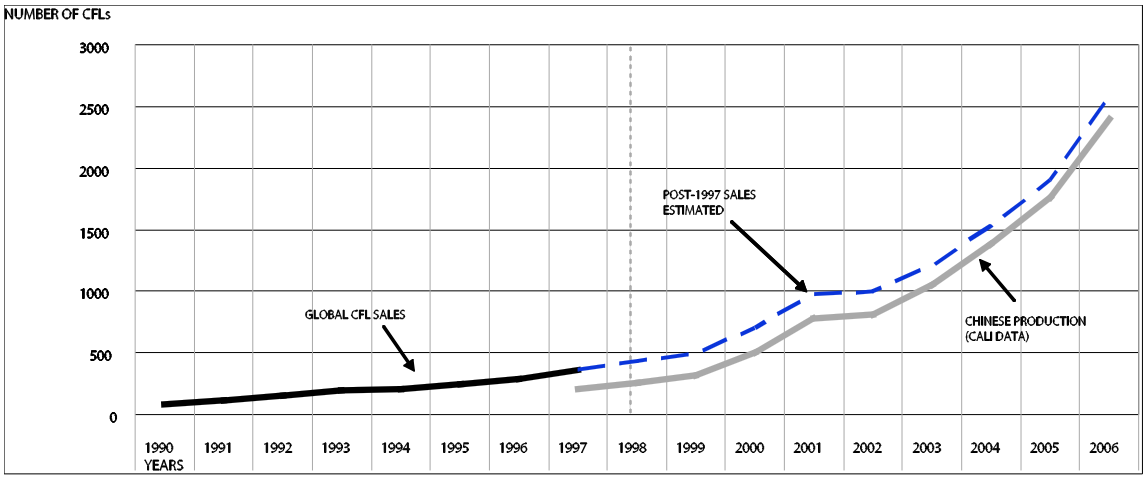
The increased adoption of high-quality, energy-saving CFLs can provide the Asia region with an important opportunity for mitigating climate change, while also enhancing international collaboration on common clean energy challenges. The high-level political commitments worldwide to phase out incandescent lamps, without adequate planning for production and quality issues, have the makings of a large-scale policy failure. The report recommends that governments and private sector lighting suppliers in the region come together to develop and implement a viable, regional quality control scheme within the next 12 to 18 months – or risk losing consumer confidence due to the proliferation of shoddy CFL products. Existing international standards and specifications are available. A number of regional and international initiatives addressing CFLs are planned or in place. The challenge is for governments and suppliers to seize the initiative by working together to develop a common, harmonized approach to the problem of CFL quality.

1.INTRODUCTION

Concerns about energy security, air pollution, and climate change have prompted Asian policymakers to place more focus on the need for energy conservation and clean energy promotion. This focus has resulted in a proliferation of high-level international and regional initiatives on energy efficiency, renewable energy, energy security, and energy cooperation in the region. Of the many available technological options, the compact fluorescent lamp (CFL) – which can directly replace a standard incandescent lamp, uses 75 percent less energy, and lasts six to ten times as long – has the potential to be an important, highly viable, and quickly implemented solution.

Recent national and local efforts to promote energy efficiency have been gathering strength in Asia and around the globe. Many of these programs feature the CFL as a mainstay in delivering energy conservation in the residential sector. The increasing focus on this robust energy-efficiency measure has significantly accelerated the global demand for CFLs. Indeed, world-wide CFL production has seen a dramatic increase, reaching more than a billion units per year earlier this decade, and now exceeding 2 billion units annually (see **Figure 1**).

FIGURE 1. ESTIMATED GLOBAL CFL SALES AND CHINESE PRODUCTION



Sources: International Association of Energy-Efficient Lighting IAEEL for pre-1997 data; estimates by the Chinese Association of Lighting Industries (CALI) and ECO-Asia CDCP for post-1997.

Recent political commitments by a number of nations to limit their greenhouse gas emissions have also helped to further shine a spotlight on CFLs. This is because these political commitments to reduce emissions often include the phasing out of incandescent lamps,[4] with CFLs as the immediate preferred alternative. In fact, investments in energy-efficiency programs as well as the level of consumer awareness of energy efficiency and the link to climate change may be at a higher point than anytime in the last five years.[5] These factors combine to further increase the market for CFLs. In fact, if the current trend continues, global CFL production stands to reach, if not exceed, 4 billion units annually before the end of this decade, and plans to phase out incandescent lamps may cause CFL production to increase to as many as 10 million units.[6]

4 Incandescent lamps are also commonly called general lighting service, or GLS, lamps. The phase-out of incandescent lamps is sometimes referred to as the "GLS phase-out".

5 Appendix 1 contains a brief description of key regional and international programs aimed at promoting and improving the quality of CFLs.

6 "Global Lighting: Phase Out Incandescent Lamps." Project Identification Form under the GEF Trust Fund for the Global Environment Facility. 15 July 2007.

World-wide production in the billions of units is a new status for the CFL, which had its beginning in the 1970s and has experienced a number of makeovers. Starting as a curiosity product for eco-zealots in the 1980s, it had kindled sufficient interest to help transform it into a high-tech, precision-made, limited-production product by the late 1990s. Since then, its potential of up to 75 percent unit energy savings and long life has propelled it to become the globalized and commoditized product seen today. As this globalization process has proceeded, the manufacturing of CFLs has expanded from a handful of well-known manufacturers to literally hundreds around the globe. This rapid growth in CFL production has been driven in part by a plethora of national CFL programs, whose success depends on CFLs to deliver their promised energy-savings, and long-lived performance.

The political commitments for the phase-out of incandescent lamps, as well as energy-efficiency programs that promote CFLs, are premised upon the assumption that lighting suppliers can meet the future need for CFLs with products that perform well, save energy, and satisfy consumers. However, for a market that has experienced a 13-fold increase between 1990 and 2004, and has since doubled, there are many risks associated with the current global CFL expansion, in both capacity and quality of the products that are available.

The objectives of this report are three-fold. First, it provides an overview of CFL markets[7] and programs in China, India, and the four largest ASEAN nations – Indonesia, Philippines, Thailand, and Vietnam. These six countries, which are the focus countries of the ECO-Asia Clean Development and Climate Program (CDCP), account for 96 percent of the GDP of Asia's developing economies and a significant share of the global CFL market. [8] Second, the report presents an assessment of the quality of CFLs currently available in regional markets. Finally, the report proposes a strategic framework for improving the quality of CFLs, by linking together a number of current and planned initiatives on CFLs and energy-saving lighting. Specifically, the report proposes an immediate and intensive coordination of existing regional CFL initiatives in order to support development of a broad-based quality assurance process for CFLs in Asia. Such a quality assurance program can help identify good-quality CFLs for policymakers, manufacturers and consumers alike, and can support the development of effective price signals for CFL quality in the marketplace.

2. THE STATE OF ASIA'S REGIONAL CFL MARKET

The countries surveyed for this report are all considering or undertaking significant efforts to promote the adoption of CFLs in their country. These surveyed countries all see the value of the CFL in helping them to improve their energy efficiency and energy security, while helping their citizens to take advantage of the new lighting technology. All are seeing sizeable increases in their national CFL markets, with significant changes and variations in manufacturers, brands, product performance, and distribution channels compared to several years ago.

Most importantly, the programs and initiatives undertaken by these countries to increase the adoption of CFLs all face similar challenges. Specifically, the main challenges that the countries and the region as a whole are facing include:

7 This report only addresses the market for "self-ballasted" CFLs, which comprise the vast majority of CFLs sold in the Asia region. It does not cover the market for "pin-based" CFLs, which have a separate ballast.

8 This paper occasionally refers to these six countries as the "surveyed countries."

- **Sub-standard CFL quality.**[9] Poor-quality CFLs are entering the region's lighting market in significant quantities, either through imports or internal manufacture. Even if a country has minimum requirements in place, it may lack the technical standards or the method and means of assuring CFL quality.
- **Lack of product quality standards for CFLs**. Large numbers of CFLs available in the region are increasingly manufactured in a centralized location, but are not regulated by a harmonized or common set of standards. Because of the lack of common standards for testing and labelling CFL quality, manufacturers currently have little incentive to produce high-quality CFLs.
- **Lack of consumer awareness regarding CFL quality**. Because each country maintains largely different standards of expected quality, or no standard at all, consumers are left to distinguish between products with no set of quality guidelines or indicators on which to base their CFL purchase. As a result there is no market signal to indicate that a CFL that costs more may be of higher quality and last longer.

The above challenges strongly suggest that there is a need for a regional approach to address these common challenges to the promotion and adoption of high-quality CFLs.

2.1 METHODOLOGY

This report draws upon, and extends, a CFL benchmarking review that was carried out for the Australian Greenhouse Office (AGO) in 2006 to support the International CFL Harmonization Initiative.[10] The AGO report presented detailed data on CFL market characteristics, testing, certification procedures, and costs associated with mandatory and voluntary compliance regulations for CFLs. The AGO report also included a survey of manufacturers, governmental officials, and program implementers in Asian countries.

During mid-2007, ECO-Asia CDCP surveyed expert groups in six countries to collect and update information on CFL market size, quality, production capacity, and existing and planned actions to promote CFLs.[11] The results of these surveys, as well as information provided by a number of CFL manufacturers, were used to update the data from the AGO report, and these new data were incorporated into the findings of this report.

2.2 REGIONAL MARKET DATA

There is no doubt that the worldwide market for CFLs is growing rapidly, with substantial growth happening in many parts of Asia. Where survey data are available, it is clear that the CFL markets in the surveyed countries are all experiencing extremely rapid growth (see **Table 1**). In estimating the countries' market sizes, the research team attempted to establish the overall market for the region by aggregating the CFL market in each country, while also examining other defining factors, such as brands and the market segments occupied by each of the CFL categories.

In contrast to the early stages of CFL production, during which CFL manufacturing was dominated by a few well-known international brands (e.g., Phillip, OSRAM Sylvania, General Electric, and Panasonic),

9 While there is no definition of a "sub-standard" CFL currently, this report uses this term to describe lower-quality products, typically with less than 6,000 lifetime hours and/or efficacy level below 45 lumens per watt. Occasionally, the term "lower-quality," "low-quality," or "shoddy" CFL is also used.

10 *International CFL Market Review: A Study of Seven Asia-Pacific Economies.* Published by the Australian Greenhouse Office, 2006. Includes annexes with market assessments for Australia, China, India, Indonesia, New Zealand, Philippines, and Vietnam.

11 The ECO-Asia CDCP surveys covered China, India, Indonesia, Philippines, Thailand, and Vietnam. It did not cover two countries that were included in the AGO report – Australia and New Zealand.

with production based in Europe, the US, Japan, and China, CFL manufacture is now being carried out by a large group of less well-known manufacturers. China currently leads the region (and the world) in the number of CFL manufacturers. At present there are at least 150 CFL manufacturers and 200 suppliers of special CFL materials and components in China, where more than 90 percent of the CFLs sold worldwide are currently manufactured.

TABLE 1. SUMMARY OF REGIONAL CFL PRODUCTION AND SALES[12]

	Annual Volume (in million units)					
Country	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
China	750	800	1,040	1,380	1,760	2,400
India	NA	34	40	46	70	100
Indonesia	10	40	50	60	70	90
Philippines	4.5	NA	NA	18	25	NA
Thailand	NA	NA	NA	NA	10	15
Vietnam	NA	NA	5.4	7	8.4	11

Source: Based on the Australian Greenhouse Office Report, International CFL Market Review: A Study of Seven Asia-Pacific Economies (2006). Supplemented with interviews during May to September 2007 by ECO-Asia CDCP.

As of 2005, the eight largest Chinese CFL manufacturers had a combined output of 400 million CFLs per year, or more than 30 percent of total Chinese CFL production (note that this number is likely to have increased significantly for 2006 and 2007). China exports CFLs to several overseas markets, and the United States is a leading importer. In 2004, CFL exports to the United States accounted for about 17 percent of China's total CFL export value. The largest export markets for China after the U.S. are Brazil, Indonesia, Japan, South Korea, Germany, Canada and Mexico. These eight export markets account for more than half of all CFLs exported from China.

In contrast to China's growth in CFL manufacturing, the number of CFL manufacturers in other Asian countries surveyed has fluctuated in the past five years. Of the five other countries surveyed besides China, only India, Indonesia, and Vietnam still have domestic manufacturing plants. The combined production output of factories in Indonesia and Vietnam in 2006 was less than one percent of China's total annual output. However, with additional market growth and the proliferation of demand-side management (DSM) programs in each of these countries, their output is expected to increase, especially for Indonesia.[13]

India has also been working in the past few years to build up its production capacity with the intent of displacing some of China's 90 percent share of global production. If India's projected estimates holds true, the number of CFL units produced annually in India will rise from 70 million in 2005 to 172 million in 2009, representing a five-fold increase from the 2002 production level. Along with this increase in production, India expects to establish a larger global market for its CFL exports.[14]

12 Data for China represent total CFL production. It is estimated that domestic CFL sales in China are in the range of 400 to 500 million annually. Data for other countries represent estimates of total in-country sales (production minus exports, plus imports).

13 As of October 2007, Thailand was beginning to convert some factories from the manufacture of incandescent lamps to the manufacture of CFLs.

14 India recently reported that tariffs on sub-standard CFL products have reduced their estimated market share.

TABLE 2. ESTIMATED NUMBER OF MANUFACTURERS

Country	**Estimated Number of CFL Manufacturers in 2006**
China	150
India	8
Indonesia	11
Philippines	0
Thailand	0
Vietnam	7

Source: Australian Greenhouse Office 2006 and ECO-Asia CDCP 2007

Along with the recent increase in the number of CFL manufacturers, the number of CFL brands and models that currently exist in the surveyed region has experienced rapid growth. Depending on the market conditions in each of the surveyed countries that import CFLs, there are also CFL brands and models from assemblers or private-label distributors. Indonesia represents one of the extreme cases, where there are more than 150 CFL brands registered with the Department of Trade.[15] However, fewer than 10 of these are well-known international brands, and many are local brands of imported CFLs. A few brands are found only in the provinces in Indonesia, while others are available nationally.

3. THE ISSUE OF CFL QUALITY

Not surprisingly, the proliferation of manufacturers and brands, along with the increase in production capacity and demand for CFLs, has resulted in intense price competition in many markets, and this pressure is reflected in the quality of available products.

3.1 WHAT MAKES A "POOR" QUALITY CFL?

The pressure to lower production costs in order to sell CFLs into Asian markets has driven manufacturers to produce CFLs using lower-cost components to meet the falling "price point" of CFLs in the market.[16] CFLs produced in this manner tend to have lower efficacy, shorter lifetime, less consistent color rendering, or a combination of all three shortcomings, when compared to CFLs currently available in many western economies or even with CFLs typically available in the region a few years ago. CFLs with lower-cost components may also have other undesirable characteristics, such as slow start time or significant lumen depreciation. In addition, manufacturers of these CFLs tend to not subject their products to rigorous testing or quality control measures, since they are under pressure to very tightly manage their costs.

This situation has the effect of creating a "race to the bottom" in terms of CFL product performance for many market segments – a trend that is confirmed through discussions with both consumers and experts around the region.[17] The term "CFL quality," which was previously used to describe the

15 At one time, this figure was 550 brands.

16 For CFLs, the "price point" is the price at which demand is relatively high. Increasing the price beyond this point may cause CFL sales to fall dramatically.

17 This is similar to the situation seen in the US and other countries in the late 1990s, prior to the advent of ENERGY STAR and other CFL quality marks.

characteristics of the light from CFLs, is now more commonly used to refer to overall CFL performance, including: testing, efficacy, lifetime, color rendering, and color temperature.

Since CFLs are being promoted as a direct replacement for incandescent lamps, CFLs that do not outperform incandescent lamps in any of the above performance metrics 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 typically poor-performing CFLs that are being produced in large quantities and sold in many markets in the region.[18] Unfortunately, as is discussed in this report, there is no commonly used regional or international standard for CFL quality and performance. Therefore, CFLs need to be assessed in relation to either national standards and guidelines, or to manufacturers' advertised claims. *Generally speaking, a poor-quality CFL is a lamp that burns out faster, or gives off less light, than advertised, or than prescribed by national standards and guidelines.*

3.2 DEFINING MARKET SEGMENTS

Due to the lack of publicly available test data on CFL quality, it is difficult to accurately characterize the nature and quality of CFLs available within Asia. Instead, this analysis draws on a previously developed metric outlining four broad market segments to approximate the quality of CFLs in Asian markets, using available data on a combination of criteria – such as claimed or tested product lifetime, evidence of product certification and registration, etc. – that serve as rough proxies of product quality.[19]

As can be seen, this method is inexact, and somewhat subjective.[20] A preferred methodology would be to first define the benchmarks for a "good" quality CFL, taking into consideration factors such as product lifetime, efficacy, lumen depreciation, safety ratings, etc. in order to more accurately segment the market and provide a product baseline. *However, in the absence of available test data for countries in the region, this method of market segmentation serves as the only available means for estimating CFL quality.*[21]

TABLE 3. BREAKDOWN OF QUALITY MARKET SEGMENTS FOR SELF-BALLASTED CFLS[22]

Market category	Description of market category
High quality – International/Well-Know brands	• Well-known name brands, such as OSRAM, Philips, National/Panasonic, GE, etc. • ≥ 6,000 hour lifetime • Evidence of testing and/or quality registration
High quality – National/ Not-well know brands	• Not well-known name brands • ≥ 6,000 hour lifetime • Evidence of testing and/or quality registration
Poor quality	• Not well-known name brands • 3,000 to 6,000 hour lifetime • Little or no evidence of testing
Very poor quality	• Not well-known name brands • ≤ 3,000 hour lifetime or no claimed lifetime • Little or no evidence of testing and/or quality registration • Typically US$1 or less in the market

18 This is not an abstract concern: an extensive market failure of CFLs occurred in the U.S. during the early 1990s. As a result of the negative consumer backlash from the proliferation of poor-quality CFLs, it took many years for consumers to regain confidence in CFLs as a quality lighting product. The lessons learned from the U.S. experience are documented in a report by the Pacific Northwest National Laboratory (2006).

19 *International CFL Market Review: A Study of Seven Asia-Pacific Economies.* Published by the Australian Greenhouse Office, 2006.

20 For example, "well known" is a very subjective term, as consumers in some markets may not recognize GE and Panasonic as well known CFL brands. In addition, the fact that the product is manufactured by a well known brand alone does not guarantee quality.

21 The methodology has been reviewed by a number of international experts. See the Acknowledgments section at beginning of the report.

22 This market segmentation approach was originally developed for the Australian Greenhouse Office's CFL benchmarking report in 2006. The categorizations are slightly revised for this report, based on comments by a number of international expert reviewers.

3.3 ESTIMATES OF MARKET SHARES

A number of CFL and lighting experts in each of the surveyed countries reviewed the data in the 2006 AGO report, and estimated the market share for each of the above categories of CFL in their respective country. The results of this survey are summarized in **Table 4**.[23] While the scope of the country survey was limited, the estimates of market shares were confirmed by a number of manufacturers who reviewed this document. In some markets, high-end products are seen to be losing market share to lower end products. Note that the "poor" and "very poor" quality product categories have been combined into one category for this estimate. This is based on the assumption, suggested by CFL suppliers and experts in the region, that neither of these two categories will provide users with a satisfactory product experience.

TABLE 4. APPROXIMATE BREAKDOWN OF MARKET SHARES FOR DIFFERENT CFL QUALITY LEVELS

Country	**High Quality Well-known brands (%)**	**High Quality Well-known brands (%)**	**Poor & Very Poor Quality (%)**
China[1]	15	30	55
India	NA	NA	40
Indonesia	36	35	29
Philippines[2]	68		32
Thailand[3]	70	15	15
Vietnam	17	44	39

Source: Australian Greenhouse Office 2006, ECO-Asia CDCP 2007

Table 4 Notes: **1.** Chinese production of CFLs broadly includes two types of factories – for high-end and low-end CFLs. Discussions with industry experts suggests that the capacity utilization for factories that produce high-quality CFLs is basically 100%, while there remains significant capacity available for factories producing low quality CFLs. Some sources in China suggested that these market share data are two to three years old, and that the situation has improved somewhat. **2.** It was not possible to get an estimated breakdown between the two 'high-quality' categories in the Philippines. **3.** The share of substandard lamps in the Thai market has fallen significantly over the past two years. One reason cited by Philips Thailand is that Philips carried out market surveys, found the share of poor quality CFLs to be quite high, and subsequently lowered its CFL prices to be more competitive.

It is also important to note that low-quality CFL products may occupy a larger share of the regional market than the surveys were able to capture. This is due to a number of reasons, some of which are country-dependent, including the fact that the available country data do not adequately represent the number of "black market" CFLs – products that are not tested and therefore not registered in the formal product control system.

Based on this analysis, it appears that the total market share of low-quality CFLs – those for which there is no evidence of product testing and registration, and/or which have a rated lifetime of less than 6,000 hours – averages close to 50 percent of the market[24] (with a range of 15 percent to 55 percent). *This means that a typical Asian consumer currently has a nearly one in two chance of selecting a sub-standard CFL*. Even at the lower end (15 percent), a one in six chance of encountering a bad product does not bode well for any consumer.[25]

23 Each of the national consultants was asked to obtain estimates of market share for four different quality levels, based on market surveys and interviews with domestic suppliers. Estimates of the market shares in each country comprised by models that are of inferior quality, with low lifetimes, and not made to international standards.

24 The weighted average is close to 50%, since approximately 90% of all CFL production in Asia is based in China.

25 In contrast, experts consulted who are familiar with the U.S. and other international markets estimate that the market share of such "shoddy" products in the US and other regions, with established CFL quality specifications such as the U.S. ENERGY STAR certification scheme, is less than 10%.

TABLE 5. ESTIMATED ANNUAL QUANTITY OF LOW-QUALITY CFLS BEING PRODUCED IN THE REGION

Country	**Est. 2006 Total Production (Million units)**	**Est. % of Low-Quality CFLs**	**Est. Number of Low Quality CFLs (Million units)**
China	2,400	55%	1,320
India	136	40%	54
Indonesia	30	29%	9
Philippines	NA	NA	NA
Thailand	NA	NA	NA
Vietnam	13	39%	5
TOTAL	**2,579**		**1,388**

Source: Australian Greenhouse Office 2006, ECO-Asia 2007

To further elaborate this point, **Table 5** shows the estimated number of sub-standard CFLs being produced in the region each year based on current estimates of market segments and size for each surveyed country. The current estimated total is more than 1.3 billion units in 2006. While this table represents an extrapolation using estimated production and estimated market share, it nevertheless illustrates the magnitude of the CFL quality problem.

3.4 IMPACTS OF POOR-QUALITY CFLS

The negative impacts of poorly-performing CFLs are significant. First, if CFLs do not meet performance claims, they may not meet energy savings and greenhouse gas reduction targets as a consequence. Second, poor-quality CFLs create dissatisfied consumers, endangering the continued and increased adoption of this energy-saving technology. Other energy-saving technologies may also suffer the same perception as a consequence.

The use of lower-quality CFLs that only provide 75 percent of the energy performance (in terms of lumens-per-watt) of high quality CFLs can cause consumers to use more energy, assuming that they either need more lamps in order to get the needed amount of light, or else that they oversize the lamps (i.e. select a 23W CFL instead of an 18W CFL) to make sure they get adequate light levels. In this situation, to get to the same level of lumens not delivered by the 1.3 billion poorly performing CFLs would require an additional 23,000 GWh of electricity per year (and reduce greenhouse gas savings by 24 million metric tons of CO_2 per year). **Table 6** presents this hypothetical situation. In reality, the lost opportunity would be even more significant, since many consumers may simply switch back to incandescent sources to get the light levels that they need.[26] Simply put, lower-quality CFLs place a penalty on the potential energy savings that can be achieved with CFLs.

26 In countries such as Thailand and Australia, where incandescent lamps are being phased out, consumers will have fewer choices and therefore will be even more dissatisfied.

TABLE 6. CALCULATED POTENTIAL ENERGY SAVING AND GREENHOUSE GAS EMISSION IMPACTS OF VARIOUS CFL QUALITY LEVELS[27]

	2006 Production (Million units)	Energy Savings Potential @100% performance (GWh/year)	Energy Savings Potential @90% performance (GWh/year)	Energy Savings Potential @75% performance (GWh/year)
Annual Energy Savings @ 60 W Replacement	2,579	112,380	101,142	84,285
Annual Net Savings Loss (GWh/year)		-	55	55
Greenhouse Emissions Not Prevented (MMT of CO_2)		0	11,463	28,657
Philippines	NA	NA	NA	NA
Thailand	NA	NA	NA	NA
Vietnam	1	0	0	0

Source: ECO-Asia CDCP 2007

Another impact is waste: compared to high-quality CFLs, sub-standard CFLs will burn out sooner and create more waste for landfills – including mercury, which is contained in small amounts in CFLs.[28]

In addition, due to the fact that no common quality guidelines exist in the region today, manufacturers lack a sufficient incentive to produce high quality CFLs, and consumers gravitate toward cheaper, lower-quality products. In this case, ordinary market forces do not work, since there is no market signal telling the consumer that an expensive (e.g., US$ 3-4) CFL will last longer and provide better quality light than a cheap (e.g., US$ 1) CFL. In this environment, even a consumer who is motivated to purchase a CFL faces difficulties in choosing the appropriate product for their needs; while the consumer who is not initially motivated to purchase a CFL may not bother with the effort.

4. CFL REGULATIONS, TESTING PROGRAMS, AND THE COST OF COMPLIANCE

Table 7 provides an overview of CFL testing, standards, and labelling requirements in the six surveyed countries. Although nearly all CFLs sold in Asia are produced in either China, India, Indonesia, or Vietnam, these countries each have different test procedures, specification levels, and minimum energy performance standards (MEPS), if any at all. Most countries have at least a test protocol in place, but there is no harmonization of either test procedures or minimum energy performance requirements. And many countries have only limited means for testing CFL quality. Indeed, a lack of testing laboratories, as well as related resources (personnel and operating budgets), result in a lack of available test data, and this makes it difficult for policymakers and regulators to certify and track product quality in the market.

27 Note that this is only to illustrate the effects of sub-standard CFLs. Assumptions:
(1) Replacing a 60W incandescent lamp with a 15W CFL at 3 hours of use per day, and an average of 1.02 kg of CO_2 per kWh.
(2) Efficacy of 40 to 50 lumens light output per watt for sub-standard CFLs based on ELI and Philippines DOE testing. 60 lumens per watt is assumed for high-quality or export-quality CFLs

28 According to the US National Electrical Manufacturers Association, the average amount of mercury present in CFLs available in the US is about 4 to 5 mg, about the size of the period at the end of this sentence.

While CFL production is highly localized in just a few countries, the CFL market is international and dispersed. Consequently, to comply with the proliferation of different CFL standards (and test protocols), multiple testing and certification steps are necessary. This can increase compliance costs. Faced with the common weak market surveillance and compliance regime, some suppliers may choose not to certify their products at all.

TABLE 7. OVERVIEW OF CFL TESTING PROTOCOLS, STANDARDS, AND LABELING REQUIREMENTS

Country	**CFL Test Protocol**	**Basic Safety and Quality Standard**	**Minimum Energy Performance Standard**	**Energy Label**
China	✓mandatory	✓mandatory	✓mandatory[b],voulntary[a]	✓v
India[b]	✓mandatory[b]	✓mandatory[b]	X[b]	✓mandatory[b]
Indonesia	X[c]	✓mandatory	X	✓voulntary[c]
Philippines	✓mandatory	✓mandatory	✓mandatory	✓mandatory
Thailand	✓voulntary	✓mandatory	✓mandatory	✓voulntary
Vietnam	X	X	✓voulntary	X

a. Multi-tiered with voluntary and mandatory elements. b. Indian standards are expected to become mandatory in 2007
c. Standards under consideration. Note: As of October 2007, Vietnam has a number of standards under consideration.
Source: USAID ECO-Asia Clean Development and Climate Program, 2007.

4.1 CFL TESTING, STANDARDS, AND LABELLING IN THE REGION

While test results of CFL performance are scarce in Asia, national CFL standards are not, and neither are CFL product labelling programs. This situation is currently true in many regions, Asia included. To illustrate the proliferation of standards, a recent global search found 41 different national standards and labelling schemes for CFLs in place or under consideration (see **Table 8**), including:[29]

- 4 mandatory labelling programs for CFLs
- 24 voluntary labelling programs for CFLs
- 13 mandatory Minimum Energy Performance Standards (MEPS), with 1 under consideration.

29 Data based on search of the APEC Energy Standards Information System (www.apec-esis.org) in October 2007. A similar search reported in "International CFL Market Review: A Study of Seven Asia-Pacific Economies." Published by the Australian Greenhouse Office, 2006 found 33 different national labelling schemes.

TABLE 8. EXAMPLES OF CFL PROGRAMS WORLD-WIDE

CFL Test Protocol	Basic Safety and Quality Standard	Minimum Energy Performance Standard	Energy Label
Argentina		Yv(1)	
Australia	U(1)	Yv(1)	
Brazil	Ym(1)	Yv(2)	PROCEL 01 RESP/010-LUZ
Canada	Ym(1)	Yv(1)	CAN/CSA-C 861-95
Chile		Ym(1)	NCh 2695: 2002 NCh 3020: 2006
China	Ym(1)	Yv(1)	GB/T 17263-2002 GB 19044-2003
Colombia	Ym(1)		NTC 5101 NTC 5103 NTC 5102 NTC 5109
Czech Republic		Yv(1)	
Ghana	Ym(1)	Ym(1)	GS 323:2003
Hong Kong, China		Yv(1)	CIE 84-1989 IEC 60901 IEC 60969
Hungary		Yv(1)	
Indonesia		Yv(1)	
Latvia		Yv(1)	
Mexico	Ym(1)	Yv(1)	NOM-017-ENER-1997
New Zealand	U(1)		
Peru		Yv(1)	
Philippines	Ym(1)	Ym(1) Yv(1)	PNS 603-2-Amd.1:2001
Poland		Yv(1)	
Republic of Korea	Ym(1)	Ym(1) Yv(1)	KS C 7621-99
Singapore		Yv(1)	CIE 84-1989
South Africa		Yv(1)	
Sri Lanka		Yv(1)	SLS 1225:2002
Thailand	Ym(1)	Yv(2)	TIS 236-2533 TIS 2310-2549
UK		Yv(1)	
USA	Ym(1)	Yv(1)	10 CFR Part 430 Subpart B App R US Energy Star
Viet Nam	U(1)	U(1)	

Key: **Yv** = Yes, voluntary; **Ym** = Yes, mandatory; **U** = under consideration
Source: APEC Energy Standards Information System (www.apec-esis.org), 2007

Each of the countries surveyed bases its national standard on the same reference standards for self-ballasted CFLs – the International Electrotechnical Commission's IEC 60968 and IEC 60969 standards. IEC 60968 is a safety standard and IEC 60969 is a standard for testing CFL performance.

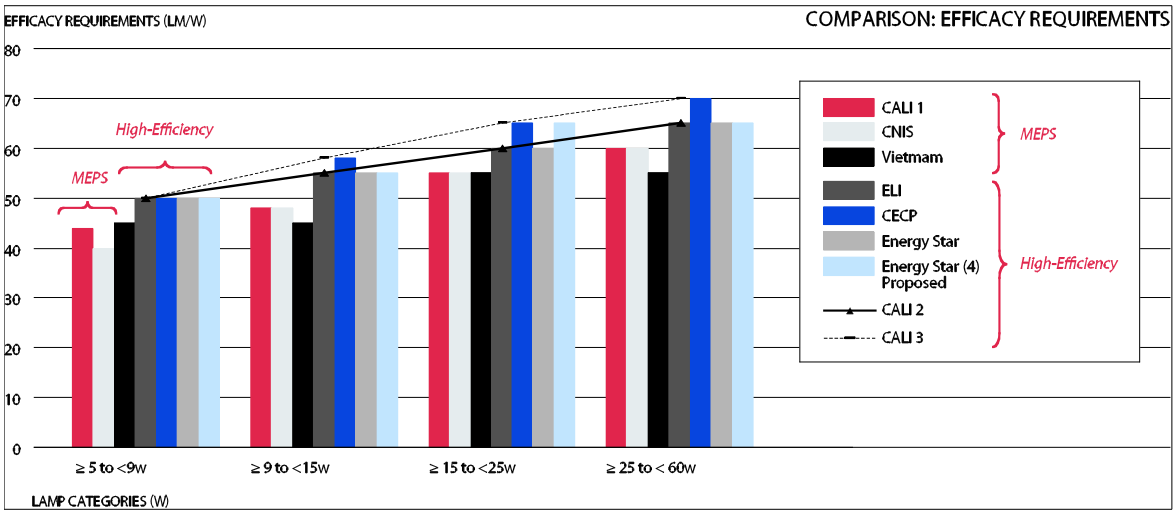
Four of the surveyed countries have imposed IEC 60968 as a mandatory safety standard, while India and Vietnam employ it as a voluntary standard. Of the six countries covered by this report, only the Philippines and now Thailand use IEC 60969 as a mandatory standard. The other countries employ this standard as a voluntary measure, with the exception of Indonesia, which has no program in place. However, Indonesia requires a Goods Registration Number (NPB) for imported products and Batch Compliance Testing.

Although most countries surveyed use a variation of the two IEC standards for performance and safety, even these permutations can vary significantly. Furthermore, many of the countries that are implementing, or designing, CFL programs are not using quality performance targets as the basis for their programs.

It is important to understand that while the IEC test protocol for performance (IEC 60969) describes how to test CFL performance, it does not actually set performance targets. Performance targets are important because they provide a way to measure the energy-efficiency levels of the CFLs. Without them, consumers have no relative indication of lamp efficacy.[30]

The requirements for CFL efficacy among various countries and programs in the region can serve as an illustrative example of this challenge. **Figure 2** shows the various requirements for CFL efficacy across four size categories. There are two types of requirements being established: minimum energy performance standards (MEPS), and voluntary targets for "high-efficiency" products (used for endorsement labelling programs). As can be seen, these requirements are all within a few lumens per watt of each other. From the graphical comparison, it is clear that a common set of requirements could be adopted among these programs without significantly affecting their results.

FIGURE 2. A COMPARISON OF SELECT EFFICACY REQUIREMENTS FOR CFLs



Key: CALI 1, 2, and 3: performance target levels proposed by the Chinese Association of Lighting Industries, under the framework of the CFL Harmonization Initiative; CNS: Chinese National Standard; Vietnam: minimum energy performance standard proposed by the Vietnamese Ministry of Industry and Trade; ELI: Efficient Lighting Initiative endorsement level; Energy Star: U.S. ENERGY STAR endorsement levels.

Source: ECO-Asia Clean Development and Climate Program, 2007.

30 The technical term for energy efficiency of a lighting source, measure in lumens per watt, is "efficacy".

Furthermore, countries with standards or minimum efficacy requirements have selected different CFL product "bins" or categories for rating CFLs (such as 8-15 watts, or 9-14 watts, etc.), further adding to the challenges facing CFL manufacturers, as illustrated by **Table 9**, below.

TABLE 9. COMPARISON OF MINIMUM EFFICIENCY STANDARDS FOR CFLS, SHOWING THE DIFFERENT SIZE CATEGORIES IN USE

BRAZIL		CHINA		MEXICO		KOREA		THAILAND	
Category (W)	Minimum Effecacy (l/W)	Category (W)	Minimum Effecacy (l/W)	Category (W)	Minimum Effecacy (l/W)	Category (W)	Minimum Effecacy (l/W)	Category (W)	Minimum Effecacy (l/W)
< 8	43.0	5-8	36-40	5	38	< 10	42	5-8	40
8-15	50	9-14	44-48	7	50	10-15	48	9-15	45
15-23	55	15-24	51-55	9	55	15-23	58	15-24	55
> 23	57	25-60	57-60	13	52.5			25-60	60
				18	60.5				
				26	61.5				

Source: APEC Energy Standards Information System (www.apec-esis.org), 2007

4.2 CFL TESTING PROGRAMS

A cornerstone of CFL quality is that utilities and governments operating CFL programs need to maintain a national set of CFL performance test results. The data allow officials to benchmark the performance of CFLs in their economy against accepted regional, national and international thresholds. Additionally, the pooling of test results can add to a common set of data by which other governments can benchmark their CFL performance.

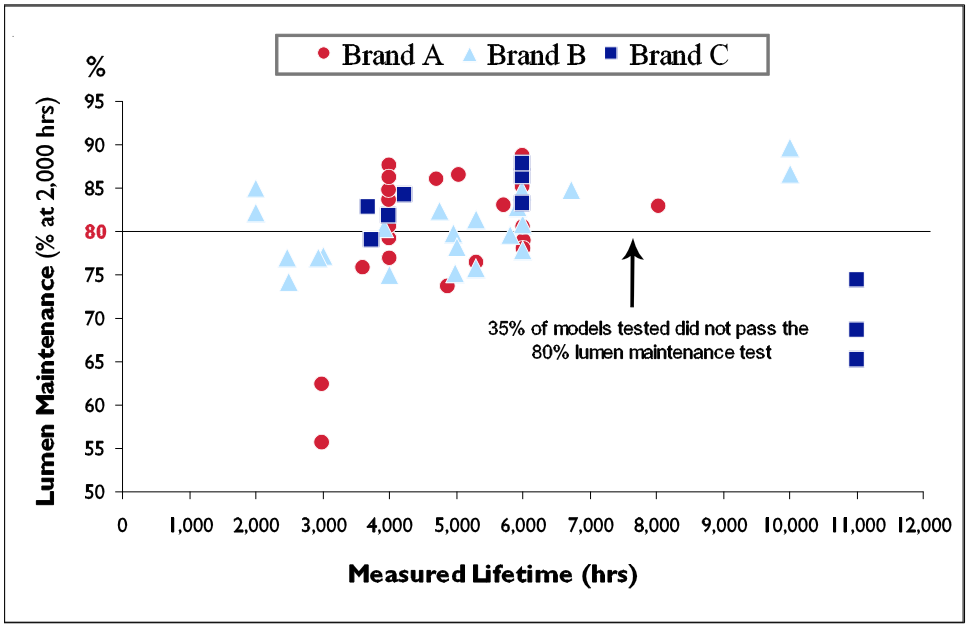
Table 10 provides an overview of the agencies in the surveyed countries that are responsible for CFL testing. The table shows the limited extent to which CFL testing is carried out, and the results publicly available. Some agencies lack the resources, authority, or available capacity for actual product testing. As a result, test data on CFL products are hard to come by, even as the number of brands and products proliferate at an ever faster pace. The Philippines Department of Energy (DOE) has one of the more comprehensive publicly available sets of tested CFL quality performance data within Asia. The data are from a publicly funded and operated, accredited test laboratory. The Philippines DOE tested 323 CFL models covering 27 brands available in the market during 2004 and 2005. As of September 2005, 296 of the 323 models had completed the test. The data used to create **Figure 3** are drawn from these tests.

TABLE 10. SUMMARY OF CFL TESTING AGENCIES AND TEST RESULTS

CFL Test Protocol	Agency Responsible for Testing	Purpose of CFL Testing	Test Laboratories Participating in the Test	Period of CFL Testing	# of CFL Models Tested and # of CFL Suppliers	Results of Testing
CHINA	Accredited testing labss	Product quality, safety, energy performance	National Lighting Test Center	NA	NA	NA
INDIA	Accredited testing labs	Consumer magazine (planned for energy labelling)	Four laboratories	2005	15W CFLs from 14 suppliers	Brand name CFLs generally good quality
INDONESIA	Bur of Natl Standards and Dir General for Electricity and Energy Utilitization	To issue SNI certificate and rate EE level, MEPS	3 accredited labs	On-going	NA	NA
PHILIPPINES	Dept of Energy and Bur of Product Standards	Compliance with specs on safety, quality, energy performance	LATL measured energy performance	2005	323 CFL models, 27 suppliers	11% of lamps do not meet ELI 1st generation specs and 33% fail lumen maintenance
THAILAND	Thai Industrial Standards Institute	Safety, energy performance	Thai Electrical and Electronics Institute	Ongoing: safety test is mandatory	All suppliers sent CFLs for testing (about 60 models)	Models that pass receive TISI mandatory performance, safety and EE standards, and voluntary label no. 5. Can be retested.
	Electricity Generating Authority of Thailand	To issue No. 5 label		EE test likely to become mandatory		
VIETNAM	Electricity of Vietnam (EVN)	Compliance with criteria for Electricity of Vietnam bulk procurement	Qualtest and TUV	2005 and 2006	NA	NA

Source: Australian Greenhouse Office, 2006

FIGURE 3. MEASURED LIFETIME VS. LUMEN MAINTENANCE FOR PHILIPPINES CFLs



Source: Philippines' Department of Energy

The results indicate that more than one-third (35 percent) of the lamps tested failed to maintain adequate light output (80% lumen maintenance compared to initial lumen output, after 2,000 hours).[31]

These results underscore a number of lessons learned from a comprehensive CFL testing program in the U.S. The Program for Evaluation and Analysis of Residential Lighting (PEARL) testing regime was formed by U.S. utilities, along with the federal and state governments, to ensure product compliance with the US ENERGY STAR guidelines. The results were obtained by purchasing and testing products in the market, and were shared among utilities to help improve program performance and product selection. Manufacturers were informed of the results after the testing, and were provided with the opportunity to improve their product performance, or to withdraw from the program.

The regular review of market test data helped to pinpoint problematic products, while also providing feedback on the performance levels of products in the market with respect to the guidelines. In particular, the results were used by U.S. authorities to set new performance levels as products improved, and to identify potential issues with certain product categories.

Similar testing programs can be used to inform consumers and have been used to great effect by highlighting products that perform well, as the example below of an on-line consumer product report on CFLs from New Zealand shows (see **Figure 4**).

FIGURE 4. EXAMPLE OF HOW TEST RESULTS CAN BE USED TO HIGHLIGHT HIGH-PERFORMING PRODUCTS.

Model	Price	Overall Score (%)	Efficiency (/10)	Light Output (lux)	Bulb Life (hours)
Ecobulb	$5.95		9.1	216	10,000
Philips Tornado	$6.49		9.2	203	6000
Luxtek	$7.50		8.1	173	6000
Elite	$5.97		8.2	141	5000
Falcrest	$2.95		8.0	142	5000
Osram Dulux EE	$10.99		6.7	165	6000
Results	$6.90		6.6	147	6000
Allume	$6.95		5.2	119	8000

Compare

- To compare details of 2 or more items, select the checkboxes then click "Compare".
- For a full profile of an item, click on the item name.

This is a summary page only – more product details are available in the standard format version of this report.

Source: Online Consumer Report, New Zealand

31 This test indicates the lumen output at 2,000 hours, relative to initial rated lumen output. A common international benchmark, including that of the Efficient Lighting Initiative, is that CFLs should maintain at least 80% of their rated light (lumen) output after 2,000 hours.

4.3 THE COSTS OF COMPLIANCE

An interesting situation is developing with respect to CFL manufacturing and CFL standards that ultimately could affect CFL costs. For manufacturers who export to more than one country, compliance with different requirements for testing and certification has the potential to increase product costs and may negate pricing efficiency gains from volume production. While higher-quality components can contribute significantly to the price difference of CFLs, the AGO survey of manufacturers also indicated that compliance with different certification requirement is becoming a more significant factor in CFL pricing, especially if the product is intended for region-wide distribution. **Table 11** summarizes testing and compliance costs per manufacturer in the surveyed countries, as well as Australia. The cost of complying with testing and certification requirements is typically in the range of a few percent of production costs, and can be as high as 4 to 5 percent.

TABLE 11. SUMMARY OF SURVEY ON MANUFACTURER TESTING AND COMPLIANCE COSTS

Economy	Estimated Compliance Costs per Supplier	
	Approximate Annual Costs	Costs as % of Production Costs
Australia	SD$3,000-5,000	Up to 1%
China	USD$20,000-50,000 (domestic) USD$50,000-150,000 (export)	0.2-11.2% 0.2-4.4%
India	USD$30,000-60,000 (domestic) USD$25,000-60,000 (import)	Up to 1% SUp to 1%
Indonesia	Initial: USD$9,000 (i) and USD$2,000 (d) Annual: USD$3,500 (i) and USD$600 (d)	NA NA
Philippines	USD$10,000-$92,000 (domestic) USD$25,000 (export)	1.2-2.0% NA
Vietnam	US$ 20,000 (domestic) US$ 30,000-$50,000 (import)	NA NA

Source: Australian Greenhouse Office 2006. (Note that the compliance costs shown are per single supplier, and the total costs will be many times higher in each economy.)

5. MAIN FINDINGS OF THE REGIONAL ANALYSIS

The above analysis highlights a number of common issues that should be of interest to stakeholders working on energy policy, energy efficiency, and climate change promoters of CFLs in countries across the region.

First, the region as a whole is rapidly building capacity for CFL production, with manufacturers in a number of countries such as China, India, Indonesia, and Vietnam investing in additional capacity. The increasing demand appears to be creating shortages of raw materials and resources, such as phosphors, electronic components, and glass, even if production capacity is available. A more immediate concern than production capacity and components, however, is the quality of the CFLs themselves. Based on the

2006 AGO report and the 2007 ECO-Asia CDCP surveys, it is estimated that close to 1.5 billion CFLs produced in Asia in 2006 were of questionable quality.[32] If this issue is not addressed in the near term, programs and consumers depending on CFLs to reduce energy use and control greenhouse gas emissions will not achieve desired results.

Second, there is significant interest in CFLs, and theproliferation of CFL programs in the region can benefit from closer coordination, especially on product quality. However, there currently is no common method to identify or label quality products. In addition, there is no regional quality mark, or agreed minimum levels for CFL performance. Even if a country has minimum requirements in place, it may lack the technical standards or the method and means of testing and assuring CFL quality. Poor CFL quality can create dissatisfied consumers, thus effectively putting an end to the continued and increased adoption of CFLs, not only by individual consumers, but by others within their sphere of influence, and may negatively affect how other energy-efficient products are viewed.[33]

Third, the region is not lacking in high-quality CFLs or manufacturers willing to make them, nor does it lack available standards for CFLs and defined testing methods – in fact, the ECO-Asia CDCP review found a proliferation of CFL standards and testing requirements across the region, and this creates an undesirable situation. Currently there exists no systematically adopted and harmonized test procedure and quality standards for CFLs. Without a common measure for product quality, it is impossible to distinguish between products, aside from brand recognition, and consumers cannot separate a good quality from a poor quality CFL.[34] Similarly, without any universal quality guidelines and marking system, manufacturers have no incentive to produce high quality CFLs, and consumers gravitate towards lower-priced products as their only universal criteria for CFL selection, thus contributing to the proliferation of lower-quality products. Additionally, a lack of testing then makes it difficult for policymakers and regulators to certify and track product quality in the market.

Fourth, because there exists neither a regional agreement on CFL quality nor a harmonized set of CFL standards, the current price signal for CFLs around the region seems to put sellers of higher-quality CFLs at a disadvantage in two ways: Their CFLs are not only more expensive to produce, but they are also burdened by the additional costs of proving that they are higher quality products. *Simply stated, the main obstacle to improving CFL quality in the region is the lack of a regionally recognized minimum threshold for CFL quality.*[35]

With respect to the current price signals, there are not sufficient data to conduct and present an analysis of the weighted average price of products in each country. However, it is generally accepted that there is an average *wholesale* price difference of about US$0.50 to US$0.75 (or more, in the case of Indonesia and Vietnam) between a high-quality CFL and a low-quality CFL. Figure 5 reflects the price trends of CFLs around the region during the past several years. The figure reflects approximate wholesale prices, since it is based on the value of CFL imports divided by the number of lamps imported.[36]

32 While this number seems large, discussions with manufacturers and experts indicate that this is in line with their estimates, as is the one in two ratio for shoddy CFLs. Furthermore, as the demands for high-quality CFLs increase in other regions such as Europe and North America due to GLS phase-out initiatives, it will have the effect of depleting Asia of high-quality CFLs if steps are not taken to increase the quality of all CFLs available.

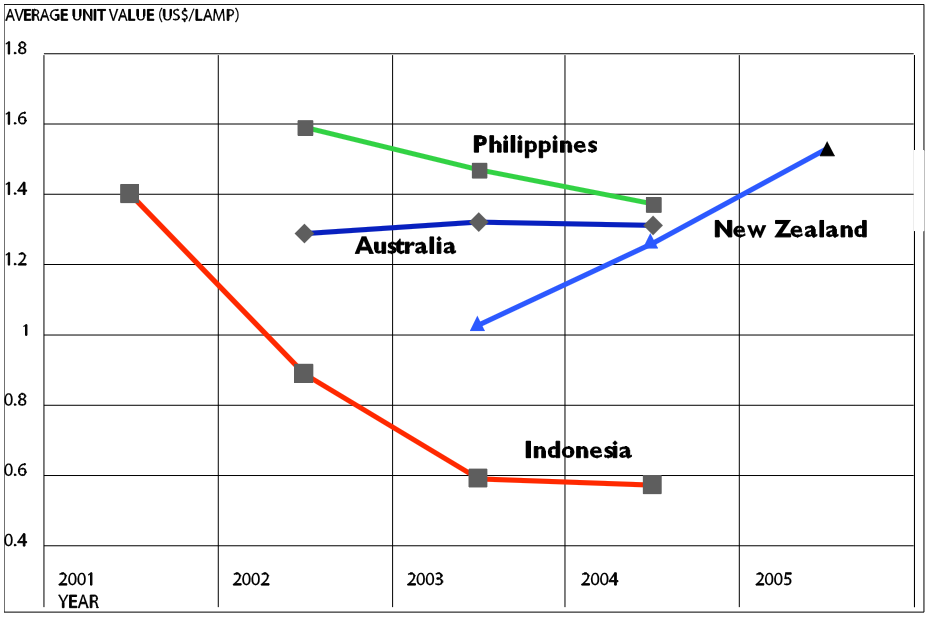
33 A major review of 30 years experience with the promotion of CFLs in North America recently found that poor CFL quality during the late 1980s and early 1990s led to a negative perception of CFLs, and that this perception has taken years to overcome. The problems included noise, green skin tons, premature failure, large lamp size, insufficient light output, and a lack of common quality specifications. (PNNL 2006)

34 A widely recognized brand does not automatically confer quality.

35 This is a situation similar to the US CFL market in the early 1990s before the ENERGY STAR program was established.

36 While it is recognized that import data are imperfect, the unit CFL value shown in the figure provides a consistent method for assessing trends in CFL value in the market.

FIGURE 5. TRENDS IN AVERAGE CFL VALUE



Source: Australian Greenhouse Office, 2006. ECO-Asia, 2007

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 COMMON REGIONAL CHALLENGES

The international CFL market is currently undergoing rapid global and regional expansion. Amid this unprecedented proliferation of CFLs, production has migrated chiefly to China and a few other locations in Asia (India, Indonesia, and Vietnam). These CFLs are in turn exported widely throughout the world. At the same time, a growing number of countries in the region are adopting CFL promotion programs, and in some cases, carrying out large-scale bulk procurement of CFLs. And a number of countries in the region (including Australia and Thailand) have even committed to the phasing out of incandescent lamps.

While all countries in the Asia region are not at the same point in their market transformation process, the current climate of CFL production and distribution creates a number of common challenges, which mainly include: the high share of poor-quality CFLs entering the region's lighting market; the lack of market signal on CFL quality and price; and low consumer awareness regarding CFL quality.

Since a number of regional and international initiatives are under way or planned, there is no reason that successful solutions cannot be tailored regionally. A move toward regional cooperation and integration fits well with the current state of awareness and the desire to take action by policymakers. As individual countries are designing their own quality and testing programs for CFLs, now is the time to scale the discussion of common approaches to CFLs up to a regional level, and recognizing existing, common solutions, before a patchwork of programs dictate the regional market. It is not a viable strategy for each country to continue creating policy and programmatic responses individually, in isolation.

6.2 FORGING INTERNATIONAL COOPERATION

Given, the globalized nature of the CFL market, a concerted, regional approach to addressing these market challenges is not only appropriate, but necessary. The strategies to harmonize product requirements, increase the level of consumer awareness and education, and achieve CFL quality assurance are not new, and a number of them have been successfully implemented elsewhere. However, the market size, geographic and economic settings, as well as the number and levels of government agencies involved are unprecedented, and can present significant challenges to such a regional harmonization effort.

This section provides a brief overview of some key international initiatives focused on improving the availability of high-quality, affordable, and energy-saving CFLs. More detailed information can be found in Appendix A.

International CFL Harmonization Initiative (CFLI). The International CFL Harmonization Initiative is an alliance of major CFL manufacturers, a number of national governments, lighting trade associations, and NGOs active in the energy and lighting field that is working together to (1) develop a single, improved international harmonized test protocol for compact fluorescent lamps based on test procedures developed by the International Electrotechnical Commission (IEC), (2) carry out round-robin testing in order to validate the new test protocol, (3) develop internationally recognized performance specifications that can be adopted on a voluntary basis by any country, and (4) share these results with the wider international community.

Global Environment Facility (GEF). The GEF is launching a global lighting initiative, with several components, including a project to scale up the process of banning incandescent lighting in the developing world, and to support increased production of high-quality CFLs.[37] GEF's BRESL (Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling Project) is aimed at accelerating the adoption and implementation of energy standards and labels for specific targeted appliances, equipment and lighting products in Asia by facilitating the harmonization of test procedures, standards and labels among developing countries in Asia. The BRESL project will focus on six countries: Bangladesh, China, Indonesia, Malaysia, Thailand, and Vietnam. CFLs is one of several products to be addressed under the framework of BRESL.[38]

The Efficient Lighting Initiative (ELI). ELI started as a seven-country, US$15 million GEF-funded initiative managed by the International Finance Corporation (IFC). ELI includes a certification scheme for energy-efficient lighting that currently focuses primarily on labelling of CFLs. The ELI Quality Certification Institute, which operates the ELI certification and labelling scheme, is located in Beijing and is managed by the China Standardization Center (CSC). ELI's CFL technical specifications have been adopted by a number of countries internationally that are operating large-scale CFL programs.

International Energy Agency (IEA). The IEA held a landmark workshop, CFL Quality and Strategies to Phase-out Incandescent Lighting in February 2007. This workshop preceded by a few weeks the wave of international policy announcements targeting the phase-out of inefficient incandescent lighting. The IEA has three ongoing international activities to support the replacement of incandescent lighting with higher efficiency alternatives. First, the IEA submitted broad-based recommendations on new energy-efficient lighting policies for consideration at the G8 summit in St Petersburg. Second, the IEA has developed the CFL Quality Charter of the Joint Research Centre of the European Commission. Third, the European Union's ENERLIN project, which aims to develop a coherent strategy to transform the residential lighting market

37 "Global Lighting: Phase Out Incandescent Lamps." Op. Cit.

38 "Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling Project (BRESL)." United Nations Development Program Project Document for submission for Global Environment Facility. September 2006.

Asia-Pacific Partnership on Clean Development and Climate (APP). The Building and Appliances Task Force (BATF) of the APP aims to support the further uptake of increasingly more energy-efficient appliances by promoting best practices and technology demonstrations. Currently, there are two BATF-sponsored "sub-projects" that contribute to regional efforts to promote CFLs. One project addresses harmonization of testing procedures, and is being funded by the U.S. and Australia. The USAID ECO-Asia CDCP (see below) is supporting this APP sub-project on CFL harmonization in China and India. The other sub-project is working more broadly on the phase-out of incandescent lamps through harmonization of testing procedures.

USAID ECO-Asia Clean Development and Climate Program. The USAID ECO-Asia CDCP works by building on existing mechanisms and standards to support efforts by governments and the private sector to improve the quality of CFLs available in the region. With regard to test procedures, ECO-Asia is promoting the use of the IEC test standards for CFLs, and the revised procedure submitted for IEC consideration, with assistance of the CFLI. With regard to performance targets, ECO-Asia CDCP is working with interested suppliers and governments in the region to support the immediate adoption of ELI as a voluntary scheme for certifying CFL product quality.

During the first half of 2007, ECO-Asia CDCP developed a Letter of Intent with major CFL suppliers and stakeholders to support efforts to improve the quality and availability of CFLs available in the ASEAN region (Appendix B); and hosted a meeting of more than 68 participants from seven Asia-Pacific countries who developed a communiqué laying out key actions needed to improve the quality of CFL produced and sold in Asia (Appendix C). ECO-Asia CDCP is also working with several lighting suppliers and ELI to develop a quality assurance scheme for CFLs. During 2008, ECO-Asia CDCP will establish an on-line database to benchmark the quality of CFLs sold in the Asia region. The database, the Asia CFL Quality Registry, will include the results of data on CFL performance and quality from around the region.

6.3 A CALL TO ACTION FOR CFL QUALITY ASSURANCE

The increased adoption of high-quality, energy-saving CFLs can provide the Asia region with an important opportunity for mitigating climate change, while also enhancing international collaboration on common clean energy challenges. The urgency of climate change, combined with political commitments worldwide to phase out incandescent lamps, without regard to production and quality issues, have the makings of a massive policy failure. It is urgent that governments and private sector lighting suppliers in the region come together to develop and implement a viable, regional quality control scheme within the next 12 to 18 months – or risk losing consumer confidence due to the proliferation of shoddy CFL products. Existing international standards are available. The challenges is for governments and suppliers to work together to develop a common, harmonized approach.

It is imperative for stakeholders in the region to work together and take a number of coordinated actions. **Table 12** summarizes a priority set of actions, and proposes which actors could take the lead in each case.

TABLE 12. SUMMARY OF PRIORITY ACTIONS TO IMPROVE CFL QUALITY

	CFL Stakeholder					
⊙ Leading Role ○ Supporting Role	Natl. Govts.	Regional Govts.	Funding Agencies	Test Labs	Suppliers	NGOs
1. Recognize that sub-standard CFLs are a serious policy problem	⊙	○	○		○	○
2. Develop regional agreement on a common test procedure	⊙	⊙	○	○	○	
3. Develop common performance quality standards for the region	⊙	⊙	○	○	○	○
4. Adopt the ELI scheme as regional quality certification level	⊙	⊙	○	○	○	○
5. Develop a framework for standards and labelling of CFLs	⊙	⊙	○	○	○	○
6. Increase public awareness about CFL quality	⊙	○	○		○	⊙
7. Seek funding for testing and compliance	○		○	⊙		○
8. Seek technical assistance in improving CFL manufacture.	○		○		⊙	
9. Provide exchange of information and technical experts	○	○	⊙			

1. Recognize that sub-standard CFLs are a problem. High-level policymakers must recognize that while CFLs represent a viable and cost effective tool for climate change mitigation, the prevalence of low-quality (i.e. sub-standard, or shoddy) CFLs in the market represents a significant barrier to the full realization of this strategy for the whole region.

2. Develop regional agreement on a common test procedure. There is an urgent need for a regional uniform process to test and assure the quality of CFLs sold in the region. Nearly all governments in Asia that have CFL programs in place use the IEC test procedures as their international reference standard. Governments should state their support for adopting the IEC test procedure as the common test procedure for testing the quality and energy performance of CFLs. This simple step – which would not require adopting any new standards, but rather would codify the common use of an existing international standard – would facilitate the testing and comparison of CFLs manufactured and sold anywhere in the Asia region.

3. Develop common performance quality standards for the region. Quality standards are needed to keep low quality CFLs out of the market. There is the need for agreement on one, or possibly two, voluntary CFL performance levels that could be recognized across the region. Government agencies and bulk purchasers of CFLs would be free to recognize the common CFL performance level, or levels, on a voluntary basis.

4. Adopt the ELI scheme as regional quality certification level. The Efficient Lighting Initiative (ELI) has an established certification scheme for CFLs that can be used by governments in the region as a common metric for defining, testing, and certifying CFL quality.

5. Develop a framework for standards and labelling of CFLs. Voluntary approaches to product efficiency are limited, and research shows that over the long-term it is important to have mandatory testing and labelling of all products in the market and develop minimum energy performance standards. CFLs should be addressed as other appliances, with a program in place to test products,

provide labelling of all products in the market to assist consumers buy high-efficiency models, and eventual adoption of minimum energy performance requirements.

6. Increase public awareness about CFL quality. Government agencies, the private sector (including manufacturers and retailers of CFLs) and NGOs in the region should take concrete actions to increase awareness of high-quality CFL products.

7. Seek funding for testing and compliance. Government agencies in the region require funding and technical assistance in setting up testing and compliance procedures. This includes funding for personnel to develop and operate compliance schemes, as well as funding for product testing. A number of countries in the region have expressed an interest in establishing national accredited laboratories in their countries.

8. Seek technical assistance in improving CFL manufacture. A number of the governments in the region have expressed the need for technical assistance for local manufacturers to help improve the quality of CFLs manufactured in their countries.

9. Provide exchange of information and technical experts. 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, as well as in recycling CFLs and dealing with end-of-life issues, including mercury content and safe lamp disposal.

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7. ACRONYMS

AGO	Australian Greenhouse Office
APP	Asia-Pacific Partnership on Clean Development and Climate
ASEAN	Association of Southeast Asian Nations
BPS	Bureau of Product Standards (Philippines)
BRESL	Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling Project
CALI	Chinese Association of Lighting Industries
CFL	compact fluorescent lamp
DEM	Danish Energy Management A/S
DOE	Department of Energy (Philippines)
DTI	Department of Trade & Industry
ECO-Asia CDCP	ECO-Asia Clean Development and Climate Program (USAID)
EE	energy-efficient
EE&C-SSN	ASEAN Energy Efficiency & Conservation Sub-sector Network
ELCOMA	Electric Lighting and Component Manufacturer's Association (India)
ELI	Efficient Lighting Initiative (initiated by IFC and GEF)
GEF	Global Environment Facility
GLS	General Lighting Service
IAEEL	International Association of Energy-Efficient Lighting
IEC	International Electrotechnical Commission
IFC	International Finance Corporation
LATL	Lighting & Appliance Testing Laboratory (Philippines)
PELMATP	Philippine Efficient Lighting Market Transformation Project
PLIA	Philippine Lighting Industry Association, Inc.
PNNL	Pacific Northwest National Laboratory (U.S.)
PNS	Philippines National Standard
PPSQF	Philippine Product Safety and Quality Foundation, Inc.

APPENDIX A

DESCRIPTION OF PROGRAMS, FUNDING, AND OBJECTIVES

THE INTERNATIONAL TREND TO PHASE-OUT INCANDESCENT LAMPS

Over the past months, several OECD nations have announced their intention to phase out incandescent lighting and have engaged preliminary legal and technical work towards this objective. A summary is contained in **Table 13**, below. The GEF reports that if all incandescent lamps worldwide were to be replaced by energy saving compact fluorescent lamps (CFL), more than 700 TWh of electricity would be saved per annum, representing an associated reduction of 400 million tons of CO_2 per year. World lighting industry leaders have also announced their support to phase out incandescent lamps, calling for a globally coordinated effort to support replacing General Lighting Service (GLS) lamps with CFLs worldwide.

TABLE 13. GLS PHASE OUT SUMMARY OF LEGISLATION TO PHASE OUT INCANDESCENT LAMPS (GLS LAMPS)

Status	Countries	Description of market category
Legislation Implemented	**Protugal**	Regulatory "carbon-tax" published in June'07, implementation in Sept'07. Regulation affects almost all GLS and halogen lamps. Models show the tax will be roughly 1€ per lamp.
	Argentina	Enacted Ban of Single-Coil GLS lamps
Legislation Actively Prepared	**Austria**	Taxation concept not supported by industry, promotional actives instead
	UK	No legislation but agreement with retailers & producers to phase out CLAS A GLS until 2011 + develop a Business discussion with a focus first on CLAS A
	Switerland	Discussion with government about ban of Energy Label F&G
	Australia	Proposal made by Australian Lighting Association to ban lamps >20 lumens/watt starting Oct 2008
	Venezuela	Ban of all GLS lamps in 2006 (draft) : stopped but expected short-term
	Vietnam	Replacement of ~40 Mio. GLS lamps /CFL+ T8 (2007-2020) (Draft)
	Thailand	Announcement that Asia Lamp and LKS will revert to CFLi production. Phase-out of GLS starting in 2008.
	Ireland	Government announced purchasing limitation for public bodies and potential taxation on GLS
	USA	California stepwise transition of all general purpose and directional lighting to high efficiency light sources by 2017 - Ban GLS after 2011 Other states: Bills to either prohibit the sale of incandescents or study possibility of prohibiting sales: 10 States Lighting Efficiency Coalition (LEC) formed in March, 2007 to develop proposal for GLS lamps, acting as sole contact group for Congress.
	Canada	Performance standards expected, not ban

Source: OSRAM-Sylvania, June 2007.

GLOBAL ENVIRONMENT FACILITY

In order to take advantage of the momentum from recent phase-out initiatives throughout the world, the Global Environment Facility is launching a global lighting initiative, with several components.

Incandescent Lamp Phase-Out. The GEF is sponsoring a project to scale up the process of banning incandescent lighting in the developing world, starting with China (scheduled to start in January 2008). The project aims to build innovative partnerships between the private and public sectors in China and OECD countries. As the single largest manufacturer of both GLS and energy saving lamps, China is an important partner for the GEF initiative. China manufacturers 90 percent of CFLs and they are currently regulated by more than 33 individual, country-level sets of MEPS and labelling programs around the world.

The project comprises three main activities: (1) the design and implementation of specific and adapted financial mechanisms that would support the steady transformation of incandescent production lines into modern, environmentally safe and efficient CFLs (2) develop and analysis of the technology issues and barriers to be overcome in order to find a balanced approach to pricing, availability and quality, and (3) the development and expansion of an effective standards, labelling, and certification plan that ensures only high quality products enter the market.

Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling Project (BRESL). The GEF-supported BRESL project will begin in late 2007 and is aimed at accelerating the adoption and implementation of energy standards and labels (ES&L) for specific targeted appliances, equipment and lighting products in Asia by facilitating the harmonization of test procedures, standards and labels among developing countries in Asia, with a particular focus on six countries: Bangladesh, China, Indonesia, Malaysia, Thailand, and Vietnam. BRESL is the only regional barrier removal initiative in Asia, focusing its efforts on transforming the regional product markets and addressing the common barriers to ES&L in participating countries by providing general information, tools, training and technical assistance. The BRESL project has program goals to establish quality standards for CFLs in at least four participating countries by Year 3 of the project and minimum performance standards (MEPS) for CFLs in at least four of the participating countries by Year 4 of the project. BRESL's key partners in the CFL product area will be ELI, CFLI, CLASP and IEA.

In addition to the GEF-supported initiative working toward a global phase out of incandescent lighting, there are several other key international actors with ongoing efforts to improve the quality of CFLs and to harmonize standards, among them the International CFL Harmonization Initiative (CFLI), the Efficient Lighting Initiative (ELI), Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling Project (BRESL), the Asia-Pacific Partnership on Clean Development and Climate (APP), the International Energy Agency (IEA, and the Collaborative Labelling and Appliance Standard Program (CLASP).

INTERNATIONAL CFL HARMONIZATION INITIATIVE (CFLI)

The International CFL Harmonization Initiative is an alliance of major CFL manufacturers, a number of national governments, lighting trade associations, and NGOs active in the energy and lighting field that is working together to (1) develop a single, improved international harmonized test protocol for compact fluorescent lamps based on test procedures developed by the International Electrotechnical Commission, (2) to carry out round-robin testing in order to validate the new test protocol, (3) to develop internationally recognized performance specifications that can be adopted on a voluntary basis by any country, and (4) to share these results with the wider international community.

THE EFFICIENT LIGHTING INITIATIVE (ELI)

The Efficient Lighting Initiative (ELI) includes a certification scheme for energy-efficient lighting that currently focuses primarily on labelling of CFLs. ELI was initiated as a seven-country, US$15 million GEF-funded initiative managed by the International Finance Corporation (IFC). After the projected ended in 2003, IFC issued an international tender and supported the establishment of the ELI Quality Certification Institute to operate the ELI certification and labelling scheme. The Institute is located in Beijing and is managed by the China Standardization Center (CSC), and ELI's CFL technical specifications have been adopted by a number of countries internationally that are operating large-scale CFL programs.

INTERNATIONAL ENERGY AGENCY (IEA)

Through the IEA Gleneagles Program, the IEA promotes energy efficiency policy and technology in buildings, appliances, transport and industry. The IEA has three ongoing international activities to support the replacement of incandescent lighting with higher efficiency alternatives. First, the IEA submitted broad-based recommendations on new energy-efficient lighting policies for consideration at the G8 summit in St Petersburg. Second, the IEA has developed the CFL Quality Charter of the Joint Research Centre of the European Commission. Third, the European Union's ENERLIN project, which aims to develop a coherent strategy to transform the residential lighting market

The IEA's landmark workshop, CFL Quality and Strategies to Phase-out Incandescent Lighting in February 2007 preceded by a few weeks the wave of international policy announcements targeting the phase-out of inefficient incandescent lighting. On March 9th, 2007, just after the IEA meeting, the European Council of Ministers called on the European Commission to establish a regulation addressing incandescent lighting by 2009 under the terms of the Eco-design of End-Use Products Directive. The IEA, in 2006, published a technical manual, Light's Labour's Lost: Policies for Energy-Efficient Lighting

ASIA-PACIFIC PARTNERSHIP ON CLEAN DEVELOPMENT AND CLIMATE (APP)

The Building and Appliances Task Force (BATF) of the APP aims to support the further uptake of increasingly more energy-efficient appliances by promoting best practices and technology demonstrations. Currently, there are two BATF-sponsored "sub-projects" that contribute to regional efforts to promote CFLs. One project addresses harmonization of testing procedures and the other is working more broadly on the phase-out of incandescent lamps through harmonization of testing procedures.

USAID ECO-ASIA CLEAN DEVELOPMENT AND CLIMATE PROGRAM

The USAID ECO-Asia CDCP works by building on existing mechanisms and standards to support efforts by governments and the private sector to improve the quality of CFLs available in the region. With regard to test procedures, ECO-Asia is promoting the use of the IEC test standards for CFLs, and the revised procedure submitted for IEC consideration, with assistance of the CFLI. With regard to performance targets, ECO-Asia CDCP is working with interested suppliers and governments in the region to support the immediate adoption of ELI as a voluntary scheme for certifying CFL product quality.

During the first half of 2007, ECO-Asia CDCP developed a Letter of Intent with major CFL suppliers and stakeholders to support efforts to improve the quality and availability of CFLs available in the ASEAN region (Appendix B); and hosted a meeting of more than 68 participants from seven Asia-Pacific countries who developed a communiqué laying out key actions needed to improve the quality of CFL produced and sold in Asia (Appendix C). ECO-Asia CDCP is also working with several lighting suppliers and ELI to develop a quality assurance scheme for CFLs. During 2008, ECO-Asia CDCP will

establish an on-line database to benchmark the quality of CFLs sold in the Asia region. The database, the Asia CFL Quality Registry, will include the results of data on CFL performance and quality from around the region. This common regional database will for the first time allow policymakers and program managers in the Asia region to compare and benchmark the quality of CFLs in their markets and in neighboring markets across Asia.

TABLE 14. LISTING OF INTERNATIONAL AND REGIONAL PROGRAMS

Organization	Area of Focus	Actions	Funding	Timeframe
Asia-Pacific Economic Cooperation (APEC)	• Asia-Pacific	Broad pronouncement supporting climate change actions/EE/lighting		On going
Association of Southeast Asian Nations (ASEAN)	• Southeast Asian Countries	Ministerial statement possible		2008 Within next year may affirm harmonized test procedures 2-4 years for recognition of test results. 2 - 5 years common set of performance tiers
International CFL Harmonisation Initiative (CFLI)	• Gloval	• Created test that incorporate all test procedures. • Submitted draft to IEC as committee draft to be finalized early 2008. • CALI defined levels for 3 tiers. • AU proposal to IEC for CFL specs.	$630,000 US funding through spring 08	Ends 2008
Efficient Lighting Initiative (ELI)	• Focus on Asia, Latin America, Africa	• Started 2005 • Specs for CFLs, linear, E&M ballast • Work on LEDs, luminaires, public lighting, DC CFLs (Africa) • Revision of CFL Std to align with China.	current funding level $200,000 US/year	Business plan with IFC vuntil 2010
USAID ECO-Asia Clean Development and Climate Program	• China, India, Indonesia, Philippines, Thailand, Vietnam	• Quality Assurance program for CFLs • CFL testing registry • Support for Investment • Serve as coordinating body	~$1m for CFL programs per year	2008 – 2009 funding available
Global Environment Facility (GEF) – BRESL*	• Bangladesh, Thailand, Indonesia, Vietnam, China	• Focus on 2 products: (CFLs, ballast for FL tubes) • Develop harmonized std for these products • Implemented by UNDP China • Could be financing mechanism for testing	$500,000 over 5 years	Will start end of 2007
Global Environment Facility (GEF) – Global Lighting Initiative	• China • Global	• Phase out of incandescent lamps • China: manufacturing, testing, CFL pricing. • Global: phase out (program design assistance)	$500,000 over 5 years	China phase-out to begin early 2008 World phase-out expected by early 2009
APP (Asia-Pacific Partnership for Clean Development and Climate)	• Asia-Pacific partners: US Japan Australia, Korea, India, China	• Focus on lighting, AC, motors • AU phase out • Addressing how to make CFLs affordable to low-income in China • Details & logistics of phase out in China	$1.75 MM from AU over 4 years • $1.5 MM for lighting programs in 4 years • $400k for testing • $500k for lighting • $250k from AU TBD from others • $200k for AP6 phase out • $200k for phase out in ChinA	China phase-out to begin early 2008 World phase-out expected by early 2009
Australian phase-out of incandescent lamps	• Australia	• National program • Testing 40 US models (EStar) results will be made public • 50 models tested for mercury (5 mg or less for CFLs)		Programs carried out in stages through 2016
VEEPL (Vietnam Energy-Efficiency Public Lighting Program)	• Vietnam	• GEF project • Focus on efficient public lighting • Input into VN std for CFLs using ELI • Technical capacity building for manufacturers • Product testing	• $3.3MM US	Started in 2004
Indonesia Bulk CFL Procurement	• Indonesia	• Rural focus • 60 MM lamps to give away • May use PLN fund	• $250MM loan from ADB, $100MM for CFLs	Expected by 2008
IEA Implementing Agreements	• OECD	• TOR developed by member countries: 5 to start: standby power, set top boxes, motors, benchmarking and lighting • IA are implemented by member countries • Policy support functions • Coordinate policy measures • Encourages long-term measures & info exchange	• 41 Agreements funded by member countries	Possibly starting in 2008

* BRESL is the Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling Project

APPENDIX B

LETTER OF INTENT TO IMPROVE CFL QUALITY IN ASEAN

Date: 3 April 2007
Location: 6th International Stakeholder Forum of CFL Harmonization Initiative, Xiamen, China
Topic: Intention to cooperate to promote harmonization of compact fluorescent lamps in ASEAN

Whereas,

- there is a strong level of international interest in clean energy initiatives that save energy and mitigate climate change, and a number of countries internationally have announced steps to phase out the use of inefficient lamps;
- such steps will need to be accompanied by campaigns and initiatives to promote and standardize the quality and performance of energy-saving compact fluorescent lamps (CFLs);
- the countries in Southeast Asia already have a number of programs in place to promote the sale of high-quality CFLs, through testing, product labeling, and minimum energy performance standards;
- the Association of South East Asian Nations (ASEAN) has set a strategic priority to develop schemes to harmonize energy-efficiency rating schemes for products sold and traded in the ASEAN region;
- a number of ASEAN lighting experts attended the 6th International Stakeholder Forum of the CFL Harmonization Initiative during 2-3 April in Xiamen, China;
- the CFL Harmonization Initiative supports the development of a harmonized international test protocol for CFLs, a common set of performance specification "tiers" that can be voluntarily adopted by countries or regions, and a systematic approach to support program compliance in order to improve the quality of CFLs sold and traded;
- the Efficient Lighting Initiative (ELI), through its ELI Quality Certification Institute, is implementing performance specifications for energy-efficient lighting products in developing country markets and operates an independent and voluntary certification scheme that covers CFL products;
- the U.S. Agency for International Development (USAID) through its Eco-Asia Clean Development & Climate Program, is working within ASEAN and the broader Asia region to promote harmonization of CFLs and other end-use products in order to stimulate increased investment in clean energy technologies; and
- manufacturers and suppliers of CFL lighting products have a strong interest in harmonizing CFL quality standards in order to reduce barriers to trade, improve product quality, and mitigate climate change …

We the undersigned, announce our intention to cooperate in order to take concrete steps to promote harmonization of testing procedures and development of a common set of performance specifications for CFLs that ~~can be~~ *voluntarily* applied by the ASEAN countries, and perhaps eventually applied more broadly in Asia

Henry C.K. Hung, Beauty Shadow Co., Ltd.	L. Liu, OSRAM (China) Lighting Ltd.	Stuart Jeffcott, International CFL Harmonization Initiative
Chen Yansheng, China Association of Lighting Industry (CALI)	Marten Willemsen, Philips Lighting China	Uwe Weber, ELI Quality Certification Institute
Siti Arni, Lighting Division, GE Consumer & Industrial	Hua Shuming, National Lighting Test Center, China	Peter du Pont, USAID ECO-Asia Clean Development and Climate Program

APPENDIX C
MANILA COMMUNIQUÉ

Communiqué from the Dialogue to Develop a Regional Quality Assurance Program for Compact Fluorescent Lamps (CFLs)

USAID ECO-Asia Clean Development and Climate Program
Asian Development Bank Headquarters, Manila, Philippines

28 June 2007

Sixty eight representatives from seven Asia-Pacific countries and seven manufacturers participated in a Dialogue to Develop a Regional Quality Assurance Program for Compact Fluorescent Lamps (CFLs). The Dialogue was a part of the Asia Forum on Clean Energy held in Manila June 26 - 28 2007 in Manila, Philippines.

The forum was sponsored by U.S. Agency for International Development's Regional Development Mission for Asia (USAID RDM/A) and the Asian Development Bank (ADB), and it was organized by ECO-Asia Clean Development and Climate Program.

The participants agreed on the following key outcomes from the meeting:

1. CFLs represent a quick, easy, and cost effective tool for the region to address energy efficiency, energy security and climate change concerns.
2. Low quality CFLs represent a significant barrier to the full realization of this strategy for the whole region.
3. There is an urgent need for a regional uniform process to test and assure the quality of CFLs sold in the region.
4. Quality standards are needed to keep low quality CFLs out of the market.
5. Participants agreed on the need for one, or possibly two, CFL performance levels that could be recognized across the region. Government agencies and bulk purchasers of CFLs would be free to recognize the common CFL level, or levels, on a *voluntary* basis.
6. The Efficient Lighting Initiative (ELI) has an established certification scheme for CFLs that can be used by governments in the region as a common metric for defining, testing, and certifying CFL quality.
7. Having a common set of defined quality levels and mutual recognition of test results will reduce manufacturer costs for testing and compliance.
8. Government agencies in the region require funding and technical assistance in setting up testing and compliance procedures.
9. Some countries in the region expressed an interest in establishing national accredited laboratories in their countries.
10. Government agencies, the private sector and NGOs in the region should take concrete actions to increase awareness of high-quality products.

11. A number of the participants expressed the need for technical assistance to help improve the quality of CFLs manufactured in their countries.
12. Multi-national suppliers were encouraged to take the lead in setting and meeting CFL quality standards.
13. Low quality CFLs have higher negative environmental impacts than high-quality CFLs.
14. Participants identified the need for a regional advisory body on energy-efficient lighting. It was suggested that the USAID ECO-Asia Clean Development and Climate Program can convene meetings of a de facto regional advisory body until a more permanent body is established.
15. The Asian Development Bank expressed its strong interest in supporting efforts to scale up investment in CFLs, as well as efforts to build capacity to test and certify CFL quality.

Participants of the session agreed to release this communiqué to record the outcome of their dialogue.

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