



## QUALITY CONTROL AND MARKET SUPERVISION OF COMPACT FLUORESCENT LAMPS IN CHINA



# EXECUTIVE SUMMARY

### INTRODUCTION

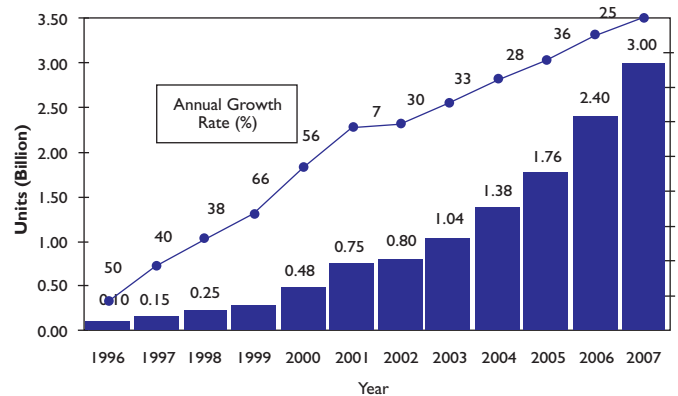
The USAID Environmental Cooperation-Asia Clean Development and Climate Program (ECO-Asia) has been working closely with China's National Lighting Test Center (NLTC) and key Chinese quality supervision agencies to strengthen governance systems for the supervision of quality and compliance of energy-saving compact fluorescent lamps (CFLs). The objective of the project is to review the process for product quality supervision, share this information with Chinese policymakers, and ensure that lessons learned and best practices from China are disseminated to policymakers in Asia.

The report "Quality Control and Market Supervision of CFLs in China" was prepared by NLTC, with input from ECO-Asia. It provides an overview of the existing framework, practices and factors affecting quality control monitoring and compliance of CFLs in China, and identifies opportunities for cooperation and improvement in the governance capacity for quality control of CFLs produced in China, both for domestic sale and for export. As the largest CFL manufacturer in the world, China offers important lessons in how to meet increased worldwide demand. This has positive implications for other countries, particularly developing nations. The report covers the history and current state of the CFL industry in China and provides an overview of Chinese laws, regulations and standards related to quality supervision of CFLs. It describes the institutional framework for quality supervision of CFLs in China and summarizes the practices and measures taken to monitor the quality of CFLs made in China, and offers some observations and recommendations for further consideration.

### CURRENT STATE OF CFLs IN CHINA

Compact fluorescent lamps (CFLs) use up to 75 percent less energy and typically last six to 10 times longer than standard incandescent lamps, and thus carry much potential as a highly

FIGURE I. Annual CFL Production and Growth Rate in China, 1996-2007



viable, cost-effective alternative. China's long-term investment in the development and production of CFLs over the past decade has earned it an enviable position amid the escalating global demand for affordable, eco-friendly lighting products. In 12 years (1996-2007), China's CFL output grew 30-fold, catapulting it to first place among manufacturers worldwide in output and exports. In 2007, China's total production of CFLs was about 3 billion, a 25 percent increase from 2006 (see Figure I).<sup>2</sup> Current and upcoming phase-out programs for incandescent bulbs around the world<sup>3</sup> will, at the very least, maintain current levels of Chinese CFL production.

The rapid increase in the production and marketing of CFLs has led to serious concerns about product quality. New manufacturers with unproven track records and limited experience have entered the market, and existing manufacturers are stretching to expand their production capacities, while government agencies and bulk buyers are seeking ways to justify and ensure their investments in CFLs. Therefore, the need to sustain or further improve CFL quality has become critical. To retain its lead in this competitive market, China's must not only maintain its current quality control regime but also

<sup>1</sup> USAID, Confidence in Quality-Harmonization of CFLs to Help Asia Address Climate Change, 2007.

<sup>2</sup> Mr. Hua Shuming (NLTC), 'Current Situation of CFL Product in China', presented at the Asia Clean Energy Forum, Manila, 2008.

<sup>3</sup> More than 40 countries have announced plans to phase out standard incandescent lamps and shift to efficient lighting technologies, including CFLs.

**TABLE I.** Quality Supervision and Inspection System (Products Sold in China)

Product Supervision and Inspection System	National Institutions or Organizations	Duties
Administrative supervision and inspection	General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ)	Implement National Product Quality Supervision and Inspection
	State Administration for Industry and Commerce (SAIC)	In charge of market supervision and regulation
Social supervision and inspection	China Consumers' Association (CCA)	Participate in supervision and inspection of commodities and services regulated by relevant administrative departments
Certification and labeling programs	China Quality Certification Center (CQC)	Implement Energy Conservation Certification Program
	China National Institute of Standardization (CNIS)	Implement Energy Label Program
Industry self-discipline	China Association of Lighting Industry (CALI)	Promote the healthy development of lighting industry
Technical support organizations	National Technical Committee on Lighting of Standardization Administration	Formulate national lighting standards
	National Lighting Test Center (NLTC)	Undertake testing of lighting products for quality supervision

discover, share and apply the lessons learned from its current efforts.

Currently, there are more than 300 CFL manufacturers in China, of which about 100 have considerable production scale.<sup>4</sup> The bulk of CFL manufacturing is concentrated in the provinces of Zhejiang, Fujian, Guangdong, Jiangsu and Shanghai.

More than 70 percent of CFLs produced in China are exported, reaching 170 countries around the world. The top five importers of Chinese CFLs are the United States, Indonesia, India, Brazil, and Korea, which together imported about 36 percent of total Chinese production in 2007

That year, 800 million CFLs were sold in the domestic market, which accounts for approximately 27 percent of China's total production. For incandescent bulbs, the total production in 2007 was 4.44 billion bulbs, of which 1.9 billion were sold domestically.<sup>5</sup>

During the rapid growth phase, with the global emphasis on large production volumes and price, and with many smaller companies using manual assembly to produce CFLs, the overall quality of the product began to decline. To deal with this problem, the Chinese government adopted a series of measures to regulate CFL production and the CFL market in China. This has helped improve the overall quality of CFLs produced in China.

## LAWS, REGULATIONS AND AGENCIES RESPONSIBLE FOR CFL QUALITY

The Chinese government has developed and enacted a series of laws governing domestic product quality supervision, standards and the protection of consumer rights and interests. These laws provide a legal basis for product quality supervision and inspection. The government has issued safety and performance standards, including regulations on hazardous substances in lighting products. Before the 1980s, China used its own national standards and sometimes Soviet Union standards.

However, with the expansion in the variety and manufacturing output of CFLs, China has since the 1980s gradually moved to using standards of the International Electrotechnical Commission (IEC) as its reference for national product standards. Along with the continuous improvement of national standards, China now also actively participates in the formulation and implementation of the IEC's international standards.

China has a well-established institutional framework for product quality supervision and inspection to support these regulations. The system can be divided into categories covering administration, social supervision, the certification/labeling program and industrial self-discipline. **Table I** summarizes the quality supervision and inspection system for lighting products sold in China.

The situation is much different for exported products, for which the above laws and regulations do not apply. Some provinces have instituted their own export regulations, and some local governments have issued regulations covering supervision and inspection of products for export. Zhejiang, for example, monitors CFL exports, inspects export shipments and oversees manufacturers' quality control. However, in general, the approach taken by China is in line with all major exporting nations: The products supplied are as specified by the purchaser. In other words, it is the purchaser's responsibility to ensure that the product specifications comply with the regulations and market needs of the importing country. Unfortunately, one commonly cited issue is the lack of technological expertise among managers of bulk procurements: buyers unschooled in technical product specifications tend to purchase stock with an eye on profit and market share, rather than product quality.

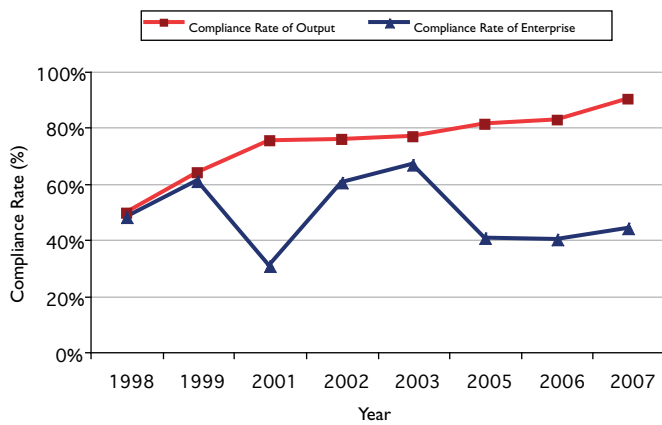
## TRENDS IN COMPLIANCE

Since 1998, China conducted an annual National Supervision and Inspection (NSI) Test on CFLs. The tests are carried out for both CFLs sampled at factories, as well as in the marketplace.

<sup>4</sup> Mr. Hua Shuming (NLTC), 'Experiences and Challenges in China on Enhancing Compliance, Monitoring and Evaluation of CFLs', presented at IEA conference, February 2008.

<sup>5</sup> 'Progress and Barriers on Phasing out Incandescent Bulbs in China', *China Energy*, 2009.

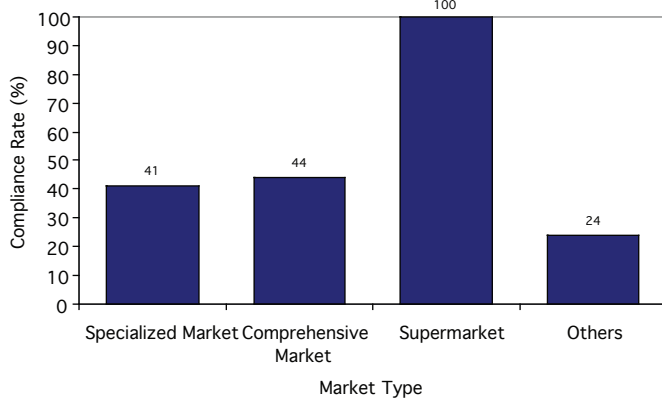
**FIGURE 2.** NSI Compliance Rates of Manufacturers and Output for CFLs<sup>6</sup> (1998-2007)



## CFL QUALITY AT THE MANUFACTURERS

**F**igure 2 shows NSI-tested compliance rates as a share of manufacturers and as a share of total CFL output. In 1998, the compliance rates were about 50 percent for both, which means that 50 percent of manufacturers met national standards, as did 50 percent of all products tested at CFL factories. Since then, the compliance rate for total CFL output has increased to nearly 90 percent. At the same time, the compliance rate for manufacturers has varied, but is now slightly more than 40 percent. This means that while 90 percent of CFLs tested at factories around China meet national product standards, only 40 percent of the manufacturing plants sampled produce CFLs that meet the national standards. This divergence occurs because 10 percent of CFL producers (large- and medium-sized enterprises) make 90 percent of all CFLs in China, so that products from these larger suppliers, which tend to be of better quality, dominate the CFL quality assessments.

**FIGURE 3.** Compliance Rate of CFLs Collected from Different Types of Stores



## CFL QUALITY IN THE MARKETPLACE

**A**ccording to the regulation, 'Methods on Inspection of the Quality of Commodities in the Circulation Sector', issued by the State Administration for Industry and Commerce (SAIC) of China in 2005, SAIC is responsible for assigning enforcement officers and testing institutes to sample and test products from the distribution and retail chain and for releasing the inspection results.

<sup>6</sup> From NSI data for years given

When the SAIC conducts CFL market supervision, nationally-accredited lighting test laboratories do the testing; when a local administrative department of industry and commerce conducts CFL market supervision, it uses local professional lighting test laboratories.

**Figure 3** shows 2006 data that compare the national standards compliance rate for CFLs purchased at different types of stores. CFLs from large-box supermarkets (i.e. hypermarkets like Wal-Mart) are virtually 100 percent compliant, but CFLs from specialized stores (i.e. building supply stores) and department stores are much less compliant, in the range of 40-50 percent, while only one in four CFLs from "other" stores complied with national standards. The inference is that large-box retailers place strong emphasis on their own brand (or franchise) identity, and employ a stricter quality control system for products they sell.

## SUMMARY ANALYSIS AND RECOMMENDATIONS

### Summary

In general, the product quality supervision system in China is well established and functions effectively. To some degree, China has been successful in addressing serious product quality control problems. However, the country's history of quality supervision is relatively short. With rapidly expanding domestic and import/export markets, the current system will need to stay ahead of CFL developments and continuously improve. Key challenges or concerns include:

- Product quality supervision is dependent on government administrative supervision. Meeting the demands of a rapidly expanding product market will challenge budgets and personnel.
- Several national organizations are involved in the product quality supervision system. However, information-sharing and exchange mechanisms need to be further improved to increase the effectiveness of product quality supervision.
- Product quality is determined not only by product design, manufacturing, and utilization rates, but also by factors like raw materials, shipping, and distribution and recycling. Besides the product quality supervision on finished-products, government should strengthen the supervision of raw materials, shipping, distribution and recycling.
- Training local administrative departments to improve their professional skills and help them better understand market needs is very important in ensuring the effectiveness of supervision and needs continual improvement.

The inspection and management of production, along with the increased promotion of national standards and requirements within businesses, have helped to steadily improve the quality of CFLs produced in China. Thanks to a decade of effective supervision and management, the compliance rate of output for CFLs reached 90 percent in 2007. However, only 40 percent of manufacturers comply with China's national product quality standards for CFLs. There remain a number of specific challenges:

- The sampling summary indicates that higher compliance rates require more stringent oversight. The quality supervision system needs to be strengthened and further improved, especially in

cities and regions with low CFL compliance rates.

- Quality supervision is mainly focused on strategies to control product safety and performance. Recently, mercury content testing has been initiated. However, opportunities exist to consider heightened control of hazardous substances in CFLs at the state and local level to prevent future pollution caused by product manufacturing, use and disposal.
- The overall compliance rate of CFL manufacturers is quite low compared to that of CFL output because of the large number of smaller, poorer-quality manufacturers. Corporate self-discipline is very important for maintaining the health and sustainable development of the whole CFL industry. However, the current degree of self-discipline among companies is quite weak compared to other measures for quality control, and potential exists for strengthening.
- Poor-quality products have taken advantage of price competition in a number of overseas markets in Asia, and supervision where the consumer purchases CFL products could be improved. Thus, strengthened supervision in the distribution and retail sector is needed.

## Recommendations

The study team recommends that the following measures be taken to improve quality supervision of CFLs in China:

### I. Strengthen Enforcement of Quality Supervision

- Currently, laws and regulations related to product quality supervision impose insufficient penalties for illegal actions and non-compliant products. Strong penalties are essential to ensure effective quality supervision; otherwise, manufacturers and distributors punished for non-compliant products may become repeat offenders.
- Media should be encouraged to expose enterprises with inferior products as well as praise those with high-quality products. Media outlets are powerful tools that can have an impact on suppliers' reputations.
- Local Bureaus of Quality and Technical Supervision, and local Administrations for Industry and Commerce (AIC), are the main implementing organizations. Training to improve personnel professional skills and capacities for enforcement of supervision at these local administrative departments is recommended.

### 2. Strengthen the Development of CFL Standards

- Chinese policymakers and regulators should actively participate in the formulation of international standards, such as IEC standards, to build a solid foundation for the harmonization of Chinese and international standards.

- Regulators should better understand current levels of national and international raw material and product performance to allow the formulation of appropriate product performance standards.
- Policymakers should work with regional organizations to foster discussion on a common set of quality standards for CFLs, in order to share relevant Chinese experience and improve the reputation of Chinese CFLs.

### 3. Facilitate Information-Sharing and Exchange

- Chinese policymakers and regulators could actively participate in international lighting events and programs, to build an international platform from which to share experiences, information and technology, and promote mutual recognition of testing results. This platform could also provide technical consultancy for policymakers of various countries.

### 4. Strengthen Training and Awareness-Raising Programs

- Accredited testing institutions could organize a series of systematic technical and standardization training programs aimed at technicians and managers of lighting enterprises, to help them better understand the market and standards requirements, and quality assurance procedures. Such programs could also provide technical support for companies to establish internal laboratories to test product quality and set internal quality control systems and benchmarking.
- Organize training programs for distributors and market management personnel to help them recognize good quality CFLs.

As with most countries, China does not regulate products for export (although the government may wish to examine the successful regulation of exports from Zhejiang Province). In line with other countries, China believes that the country of destination should implement appropriate local regulations and enforcement (as China does for products entering its market). However, this sometimes leads to supervision problems with manufacturers that claim to produce only for export, but that also supply to the local market. Increased harmonization of international standards (including China) will assist in pressuring all manufacturers to begin to build products to similar standards. Foreign purchasers should also be encouraged to review information on CFL product quality information published by the Chinese government, so as to avoid purchasing products manufactured by unqualified businesses.

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