

# LED MARKET OVERVIEW AND FORECAST - INDIA

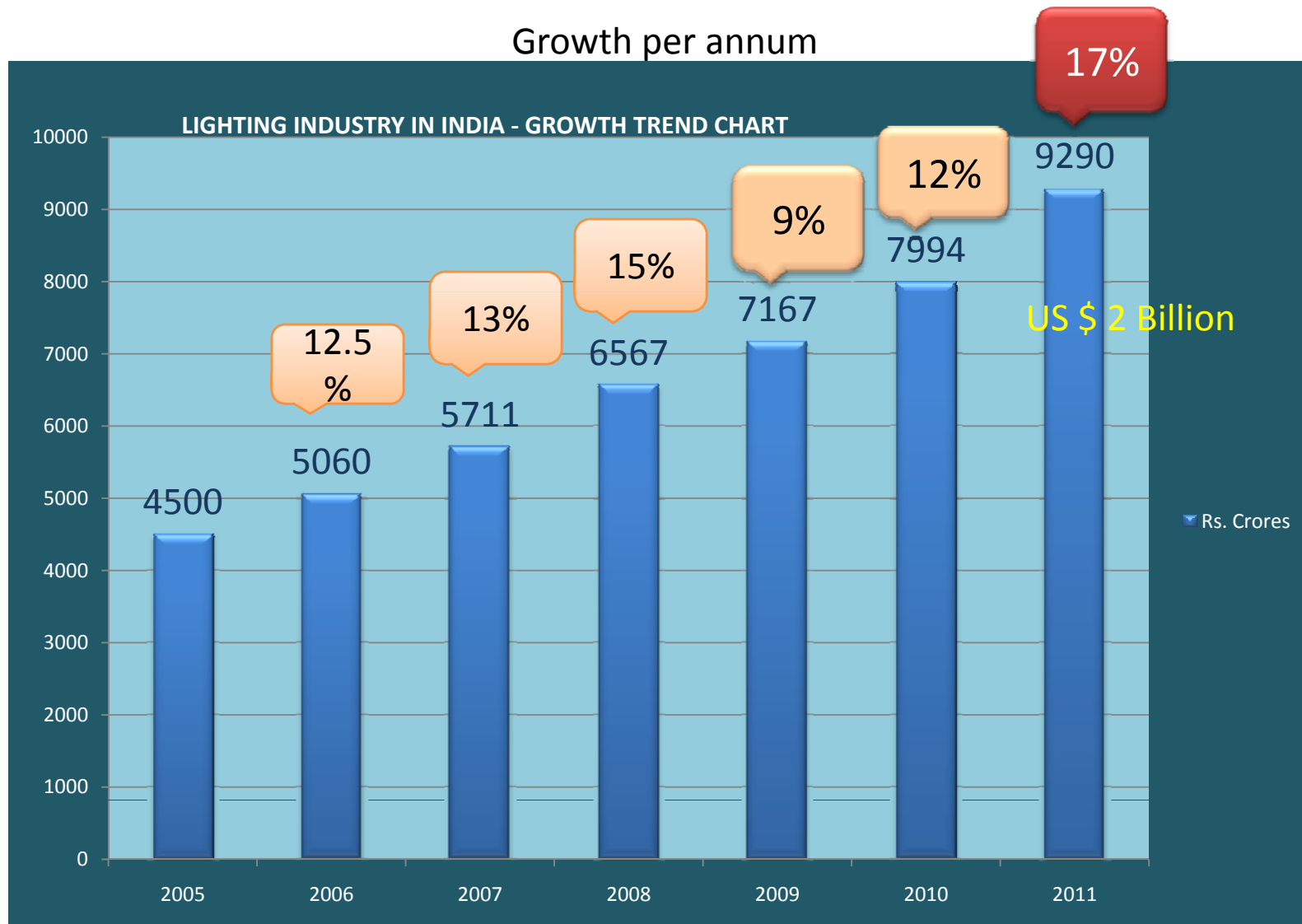
Electric Lamp & Component  
Manufacturers' Association of India

Taipei – March 12-15, 2012

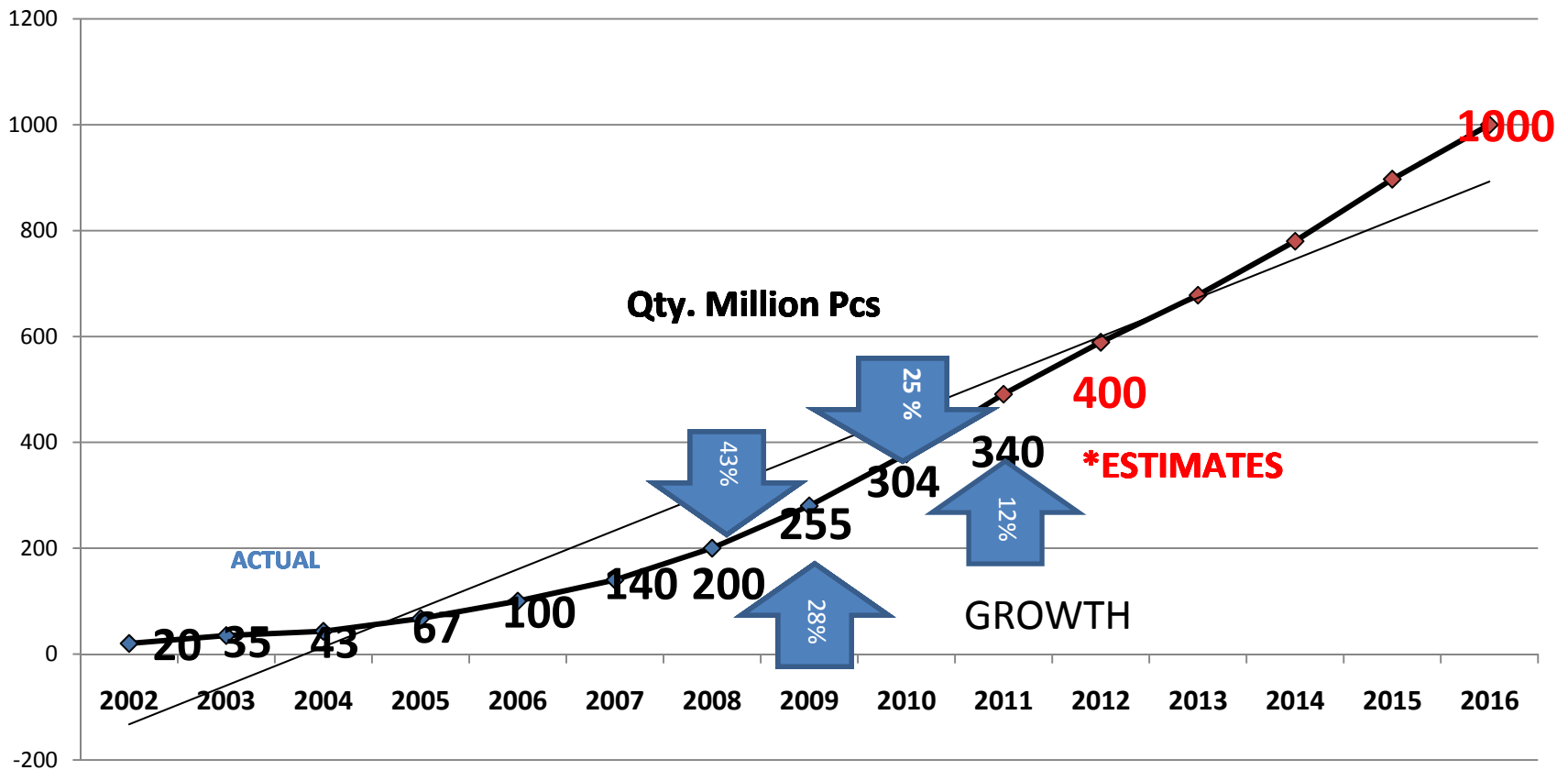
# Lighting Industry in India

- Performance year 2011

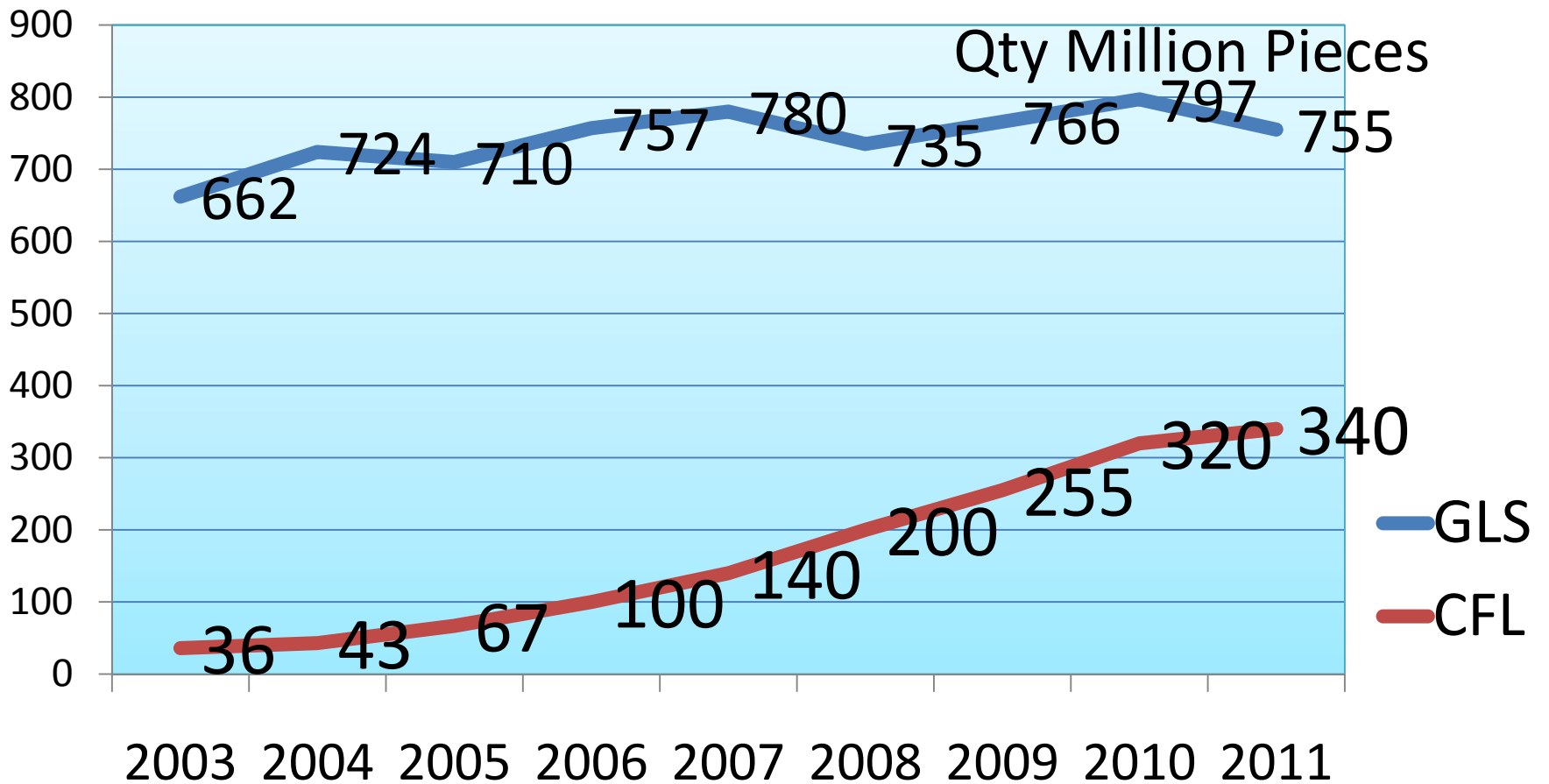
# Industry growth



# Growth of CFL in India



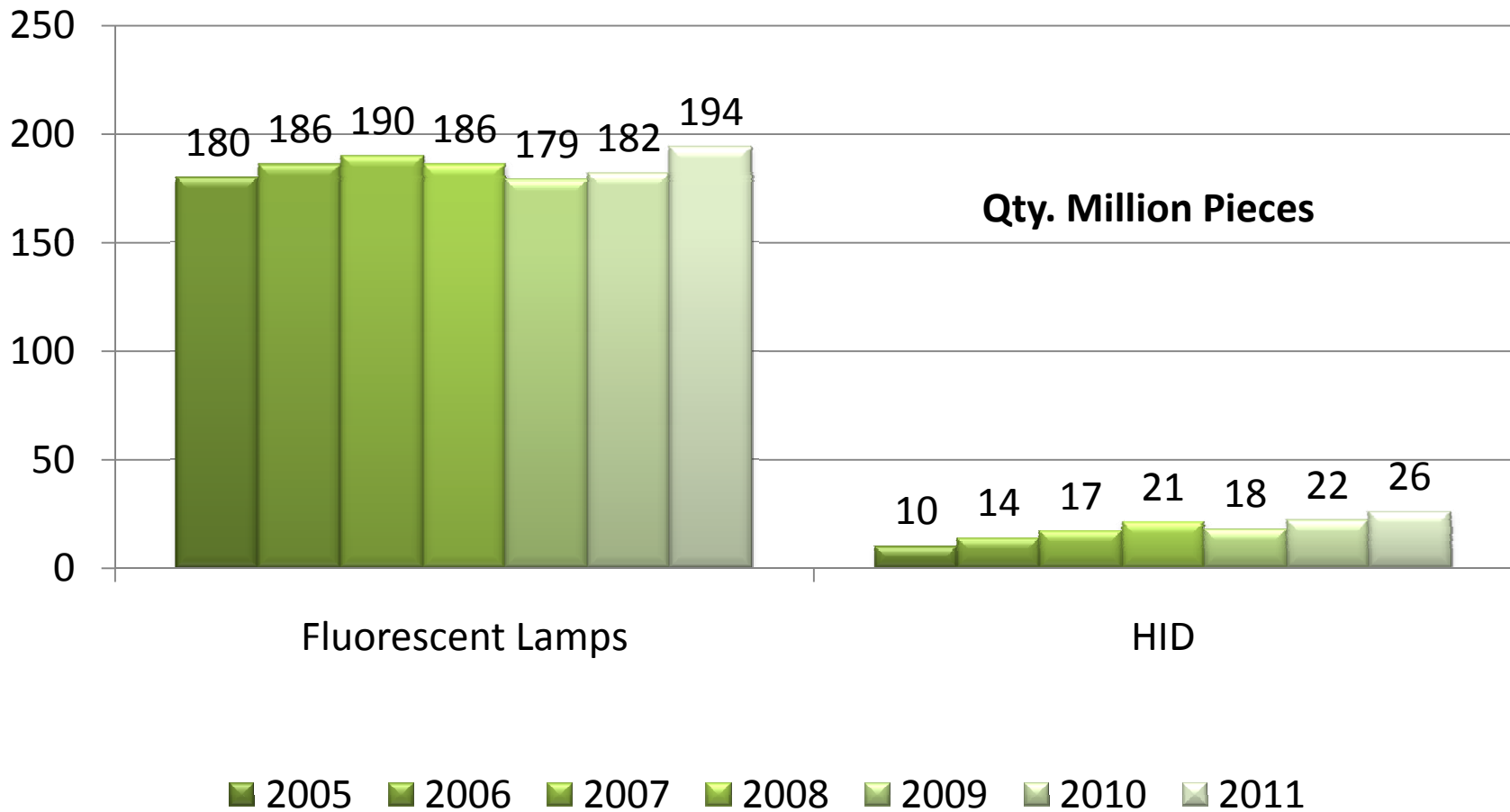
# Growth – GLS Vs CFL



# Growth of CFL manufacturing Capacity in India

YEAR	No of Manufacturers	Manufacturing capacity (Million pieces p.a.)
2002	5	19
2003	7	22
2004	10	29
2005	12	50
2006	13	80
2007	16	130
2008	20	200
2009	32	350
2010	45	500
2011	52	730
2013 (Estimate)	60	1000

# Fluorescent & HID Lamps



# LED Lighting

Stimulation for LED Lighting in India



# Barriers identified

- Limited availability of LED technology in India
- High initial cost of LEDs that makes the pay-back period very long
- Absence of National standards for LEDs as a result industry is prone to import sub standard products
- Consumer awareness very low
- Lack of testing protocols, facilities and accredited laboratories at the national level
- No incentive either to set up manufacturing facilities in India as is the case with China

# Recommendations and Proposals

- To constitute a central Institutional mechanism (CIM) which along with other stake holders shall oversee the design, development and implementation of the program and put in place a robust monitoring and evaluation process by an independent agency (like National Productivity Council)
- Aggregation of future LED demand under regulatory oversight is the appropriate way to significantly enhance volumes and therefore attract leading manufacturers to India and have co-benefit of reduced cost
- Mandating phased domestic manufacturing for such demands must be integrated in the policy framework
- Appropriate fiscal incentives need to be structured by the Government to promote LEDs in India (e.g. tax, duties, tariffs, incentive to manufacture in India etc)
- To give immediate push, initially to concentrate on commercial applications
- Recommendation to MoP to provide atleast one LED lamp under “electricity to all villages” scheme.
- Motivate Central and State government procurement agencies to take part in this program
- Setting up of a neutral, trusted testing facility urgently. (Government approved Rs. 25 Crores for this initiative last year)
- Technical standards must be mandated by BIS
- Domestic manufacturing of these technology materials and processes may be encouraged in the first phase.

**LED FOCUS AREA**

# Down Lighters

- Showrooms were using Incandescent Lamps
- With government regulation, changed to CFL down lights
- CFL not effective on product display
- Showrooms changed to halogen down lights
- Proposal to initiate central and state governments for regulation to commercial outlets to change to LED down lights
- Down Light specifications prepared by ELCOMA

# Secondary Road Street Lights

- Presently haphazard installation of streetlights by small and medium municipalities
- Industry gearing up for designing LED street lights
- Government (Bureau of Energy Efficiency) initiative to provide LED streetlights to > 100 municipalities as per program
- ELCOMA prepared streetlight specifications for government procurement and end users
- Street lighting guideline prepared by BEE

# Self Ballasted LED Lamp

- As an introduction for domestic application, attention provided for self Ballasted LED Lamp
- Specifications prepared by ELCOMA and government using it for DSM and CDM schemes
- BIS prepared standards for Self ballasted LED lamp
- Product prototypes under tests
- Price reduced from Rs. 1200 last year to Rs. 650. Likely to further reduce to Rs. 300 to Rs. 400 by the end of this year

# LED Standards & Specifications

## INDIAN STANDARDS ON LED PUBLISHED

*Following Indian Standards on LED have been published.*

Sl No	IS No	Title
1.	<b>16101 : 2012</b>	General Lighting - LEDs and LED modules – Terms and Definitions
2.	<b>16102(Part 1) : 2012</b>	Self- Ballasted LED-Lamps for General Lighting Services Part 1 Safety Requirements
3	<b>16102(Part 2) : 2012</b>	Self-Ballasted LED-Lamps for General Lighting Services Part 2 Performance Requirements
4	<b>16103(Part 1) : 2012</b>	Led Modules for General Lighting- Safety Requirements
5	<b>15885(Part 2/Sec 13) : 2012</b>	Lamp Control Gear Part 2 Particular Requirements Section 13 d.c. or a.c. Supplied Electronic Controlgear for Led Modules
6	<b>16104 : 2012</b>	d.c. or a.c. Supplied Electronic Control Gear for LED Modules Performance Requirements
7	<b>16105 : 2012</b>	Method of Measurement of Lumen Maintenance of Solid -State Light (LED) Sources
8	<b>16106 : 2012</b>	Method of Electrical and Photometric Measurements of Solid-State Lighting (Led) Products
9	<b>16108 : 2012</b>	Photobiological Safety of Lamps and Lamp Systems

*A few more standards on Led Modules (IS 16103-2) and Luminaires (IS 16107) are going to be published soon.*

# Specifications

- Self Ballasted Lamps
- Down Lighters
- Street Lights





**ELECTRIC LAMP AND COMPONENT MANUFACTURERS' ASSOCIATION OF INDIA**

A-448 Defence Colony (LGF) New Delhi – 110 024 India

June 2011

**DRAFT SPECIFICATIONS FOR LED SELF BALLASTED LAMPS**

1. SCOPE: To promote energy efficiency by phasing-out incandescent with an efficient alternative in the form of retrofit LED lamp
2. Lamp Terminology : Self Ballasted 5 watts LED Lamp (Covered) retrofit for GLS lamp in Lamp caps of B22 and E27.
3. Technical Requirement : The LED Chip should conform to LM80
4. Lamp Specifications

Parameter	Values	
Wattage	5watt	5watt
Voltage	170V~260V	170V~260V
CCT	Warm white (2700K)	Cool white (6500K)
Base Cap	B22/E27	B22/E27
PF	Minimum 0.5	Minimum 0.5
Efficacy (Complete Lamp) lm/w	=>45	=>50
CRI (Typical)	>80	>65
Luminous flux	=>225Lm	=>250Lm
Lumen Maintenance	70% at 15000 hrs.	70% at 15000 hrs.
Life	>15,000	>15,000
RoHS Compliance	Pb free	Pb free
Capacity to withstand surges	As per IEC Standard 61347	As per IEC Standard 61347

EXAMPLE OF SPECIFICATION



ELECTRIC LAMP AND COMPONENT MANUFACTURERS' ASSOCIATION OF INDIA

A-448 Defence Colony (LGF) New Delhi – 110 024 India

June 2011

DRAFT SPECIFICATIONS FOR LED DOWNLIGHTERS

- SCOPE: To promote energy efficiency by phasing-out halogen and CFL Down lighters with an efficient alternative in the form of LED lamp Down Lighter
- Luminaire Terminology : Self Ballasted or with external driver but be accessible for easy lamp replacement
- Technical Requirement : The LED Chip should conform to LM80
- Luminaire Specifications

	Luminaire type (Covered or open)	
<b>1. LED Chip</b>	Warm White (2700K)	Cool Daylight (6500K)
1.1 Lumen per Watt	> 85 L/W	> 100 L/W
1.2 C R I	> 80	> 65
1.3 Range	As per ANSI Standard	As per ANSI Standard
1.4 Working Life	50,000 hrs	50,000 hrs
1.5. Conformance	LM 80 Standard	LM 80 Standard
<b>2. Material</b>		
2.1 Heat Sink	Should be scintificallt designed to ensure the efficient dissipation of heat keeping junction temperature below 90° C	Should be scintificallt designed to ensure the efficient dissipation of heat keeping junction temperature below 90° C
2.2 Driver	External or Internal but be accessible for easy replacement	External or Internal but be accessible for easy replacement
2.3 Efficiency	≥80%	≥80%
<b>3. Electrical</b>		
3.1 Current / Voltage	50 Hz 170 to 260V	50 Hz 170 to 260V
3.2 Power Factor	> .9	> .9
3.3 T H D	As per IEC 61000-3-2 and IEC61000-3-3	As per IEC 61000-3-2 and IEC61000-3-3
<b>4. Luminaire Performance</b>		
4.1 Efficacy	=>50	=>60
4.2 CRI (Typical)	>80	>65
4.3 Junction Temperature	Less than 90° C	Less than 90° C
4.4 Ambient Temperature	-20°C to 50°C	-20°C to 50°C
4.5 Photometric Test	As per LN 79	As per LN 79
4.6 RoHS Compliance	Pb free	Pb free
4.7 Capacity to withstand surges	As per IEC Standard 61347	As per IEC Standard 61347
4.8 Guarantee	2 years	2 years

EXAMPLE OF SPECIFICATION



**ELECTRIC LAMP AND COMPONENT MANUFACTURERS' ASSOCIATION OF INDIA**

A-448 Defence Colony (LGF) New Delhi – 110 024 India

June 2011

**DRAFT SPECIFICATIONS FOR LED SECONDARY ROAD STREET LIGHTS**

SCOPE: To promote energy efficiency by phasing-out inefficient Luminaires using lamp sources like Mercury Vapour Lamps, Halogen Lamps, CFLs or other inefficient lamps with an efficient alternative in the form of LED Street Lights

Luminaire Terminology : External driver / housing with easy lamp replacement arrangement

Technical Requirement : The LED Chip should conform to LM80

Luminaire Specifications

	Luminaire type (Covered)	
<b>1. LED Chip</b>	Warm White (2700K)	Cool Daylight (6500K)
Lumen per Watt	> 85 L/W	> 100 L/W
1.2 C R I	> 80	> 65
1.3 Range	As per ANSI Standard	As per ANSI Standard
1.4 Working Life	50,000 hrs	50,000 hrs
1.5. Conformance	LM 80 Standard	LM 80 Standard
<b>2. Material</b>		
2.1 Heat Sink	Should be scientifically designed to ensure the efficient dissipation of heat keeping junction temperature below 90° C	Should be scientifically designed to ensure the efficient dissipation of heat keeping junction temperature below 90° C
2.2 Driver	External or Internal but be accessible for easy replacement	External or Internal but be accessible for easy replacement
2.3 Efficiency	≥80%	≥80%
<b>3. Electrical</b>		
3.1 Current / Voltage	50 Hz 150 to 270V	50 Hz 150 to 270V
3.2 Power Factor	> .9	> .9
3.3 T H D	< 10% or as per IEC 61000-3-2 and IEC61000-3-3	< 10% or as per IEC 61000-3-2 and IEC61000-3-3
Protection	Short circuit & Over voltage protection	
<b>4. Luminaire Performance</b>		
4.1 CCT of Luminaire	> 5500 K – 7000 K	> 5500 K – 7000 K
4.2 CRI	> 70	> 70
4.3 Efficacy	=>60	=>65
4.4 Compliance	IS 10322 for functional, photometric and safety requirements	IS 10322 for functional, photometric and safety requirements
4.5 junction Temperature	Less than 90° C	Less than 90° C
4.6 Ambient Temperature	-20°C to 50°C	-20°C to 50°C
4.7 Photometric Test	As per LN 79	As per LN 79
4.8 RoHS Compliance	Pb free	Pb free
4.9 Capacity to withstand surges	As per IEC Standard 61347	As per IEC Standard 61347
4.10 Guarantee	2 years	2 years

# **AWARENESS PROGRAM**

- Workshops / Seminars**
- LED Conclaves (Exhibition and Workshops)**
  - May 2010 - Delhi**
  - April 2011 – Hyderabad**
  - January 2012 – Mumbai**
  - MEGA LED SEMINAR IN NEW DELHI IN OCTOBER 2012**
- More workshops to be organised in Kolkata, Bangalore, Chandigarh and Ahmedabad during 2012-13**
- Publication of LED Street lighting guide for Municipalities and Public Works Departments**
- Articles and advertisements in special magazines**
- Media publicity**

# Government Support

- **White paper by BEE on “Stimulating LED in India”**
- **Government notifications:**
  - **Ministry of Commerce issued notification to Delhi Government to ensure all showrooms or show windows using Incandescent Lamp or halogen lamps to immediately replace with LED down lighters. More States to follow**
  - **Ministry of Commerce issued advisory to Ministry of Urban Development to Ensure all medium and small municipalities change to LED Street Lighting**
  - **Bureau of Energy Efficiency started Pilot programs to encourage use of LED streetlights for Municipalities and Local Bodies for secondary roads, parks and parking areas etc. – 180 bodies being funded**
- **Government bulk procurement**
  - **Preparing bulk requirement of Railways, Airport authority, Urban Housing, Highways and other large development projects to create a large demand to encourage industry to establish**
  - **LED Self Ballasted Lamp for “Bachat Lamp Yojna”**
  - **All Households within 5 k.m. of Power Generating Plants to be given one LED bulb free**
- **Test Labs**
  - **Govt subsidizing establishment of LED test facilities at existing Test Lab (About Rs. 25 Crores)**
  - **Expected atleast 3 more Test Labs supported by Government**
  - **Total expected 12 Test Labs by 2013**

# ELCOMA LED Lighting Chapter

- To cover all other LED activities an LED Chapter created within ELCOMA
  - Membership extended to
    - All LED Lighting Manufactures or assemblers – small, medium or large
    - Signage Manufacturers
    - Traffic Signals and direction board manufactures
    - Security Lighting
    - ESCOs
    - Architects, Designers, Specifiers, Engineers
    - Test Laboratories

# Vision of Elcoma LED Lighting Chapter

- To ensure federate all stake holders of LED Lighting to work together for better end products
- Cooperation between manufacturers and ancillaries for better technology development and exchange
- To promote the consideration and discussion and resolve all questions affecting LED Lighting
- To diffuse information to all members on new technology development and best practices
- Product specifications and certifications
- Undertake promotion of LED Lighting by seminars, exhibitions, workshops etc
- Exchange of statistical information
- Education for students and institutions on Energy Efficient Lighting
- Coordinate with government on various issues pertaining to requirement of LED Lighting for quality, manufacture and policy updating
- Establishment of LED Lighting excellence centre

# Test Laboratories

- 2010 – No Test Lab for LED Product testing
- Initiative by government to fund one test Lab
- Elcoma undertook with large Test Labs to upgrade for LED Testing
- 6 Labs have taken initiative
- 4 Labs are ready by January 2012
- 8 More Labs likely by 2013



# Industry penetration to LED Business

- 12 large, 15 Medium and about 600 small manufacturers in LED business
- All major chip manufacturers have based offices in India
- Binning and Packaging being started in India
- Tie up with major Global Luminaire manufacturers by most of large companies to start manufacture in India

# Successful launch of LED Lighting in India

- LED business was less than Rs. 300 Crores in 2009
- 2010 – Increased to Rs. 500 Crores
- Estimated 2011 – Rs. 850 Crores
- Estimated 2016 – Rs. 5000 Crores (US\$ 1 Billion)

# Growth of LED business in India

Value Rs. Crores

