

# National Seminar on Energy Efficient Lighting Designs

on 20<sup>th</sup> to 21<sup>st</sup> October 2009  
Mumbai

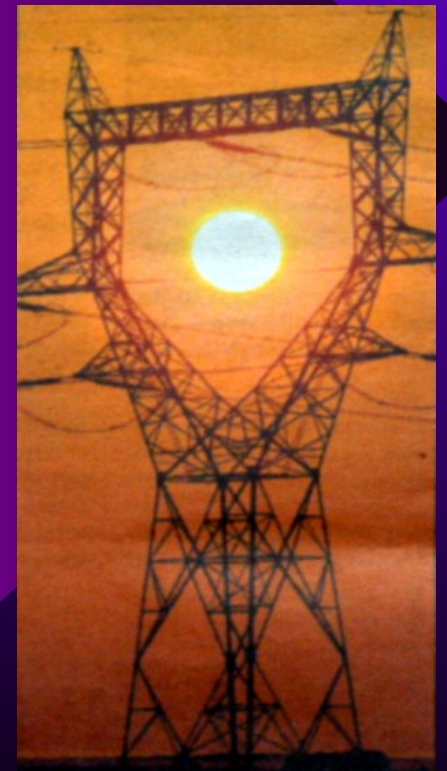
By ELCOMA



Certificate Course on  
**Energy Management  
in Lighting**  
(Proposed - Equivalent to 12 Credits)

Presentation By  
**Anil Valia**

21<sup>st</sup> October, 09  
Mumbai



# Acknowledgement

**Electrical Lamp & Component Manufacturer's Association of India (ELCOMA)**

**Bureau of Electrical Energy (BEE) Department of Energy, Ministry of Power, India**

**USAID ECO III Program**

**Indian Society of Lighting Engineers (ISLE)**

**Council of Architecture**





# **Anil Valia**

***Lighting Designer & Educator***

**BE Elect (Hons.), Chartered engineer,  
MIE (India), FISLE, MIES Emeritus (USA),  
FILE (U.K.), MIES (Australia),  
Educator - IALD (USA); CIE. EDU,  
Ex-Vice President & Founder Member  
ISLE, Fellow & Founder Member CEEAMA,  
Course Director – ILA**

## **Lighting Systems Consultant**

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Andheri (East), Mumbai-400069, India**

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# Anil Valia

- Visiting several national & international exhibitions, Factories Laboratories, attending conferences & to keep update on development in field of Light & Lighting.
- Worked on Several projects involving Technical & Architectural Lighting Design



COLOUR Asian Paints Signature store, Mumbai



# Lighting Education Activity

- Training Courses in India & Abroad– More than 100
- Technical Presentation for Seminars /Workshops - More than 1000
- Writer of technical papers in professional journals - More than 100
- Teaching in Engineering & Architectural colleges
- Introduced “Illumination” in BE Elect. @ Mumbai University in year 1997 & has been External Examiner

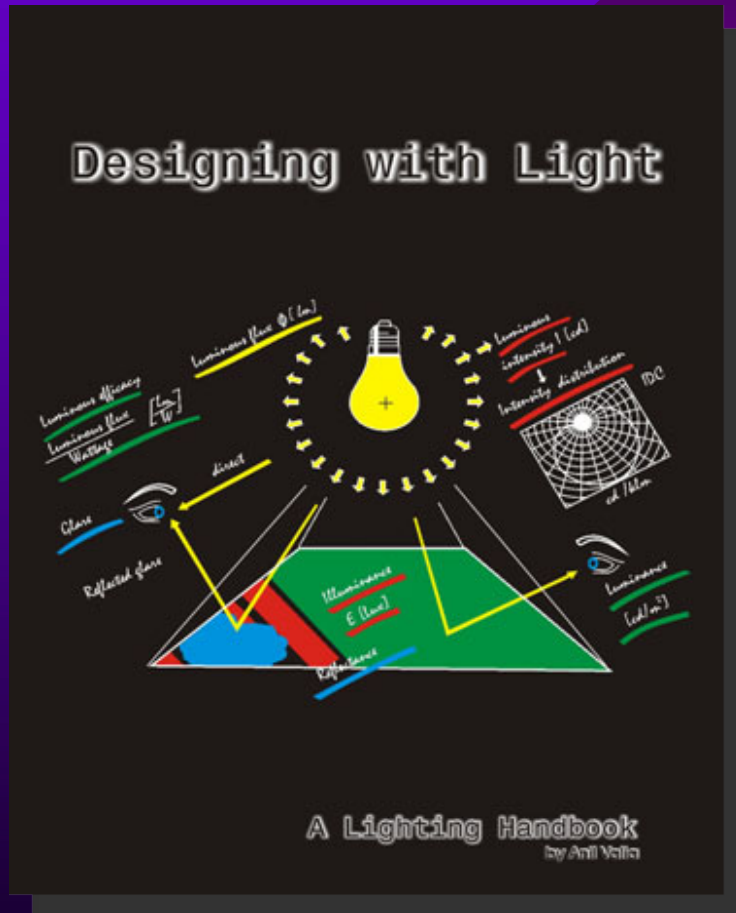


# International Paper Presentation /Acceptance

- CIE 1995 on Temple Architecture
- ILE UK 2000 Lighting Education
- LUX Pacifica 2002
- International Educator's Meet in Milano, April 2003 (by ELDA invitation)
- Right Light 6, Shanghai, May 2005 Energy Management
- Tianjin University Interior Design Students - June 2005
- PALA Singapore - LEDs July 2005 (by invitation)
- Paper On Lighting Education on website [www.lighting.com](http://www.lighting.com)



# Designing With Light



Designing With Light – A  
Lighting Handbook By

Anil Valia

Published by

International Lighting  
Academy (ILA)

January 2002





# National & International Recognition



**SOUTH BANK  
UNIVERSITY, UK**



**PARSONS COLLEGE,  
USA**



**IALD, USA**



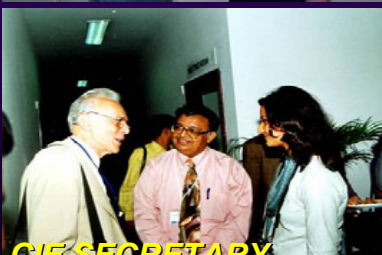
**LIGHTING EDUCATION  
TRUST, UK**



**SYDNEY UNIVERSITY,  
AUS.**



**SEEN, NEPAL**



**CIE SECRETARY**



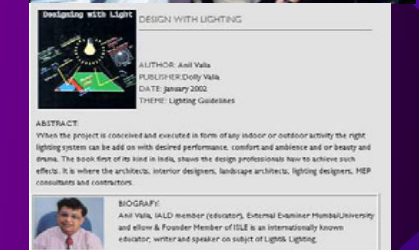
**IESNA EX-VICE  
PRESIDENT, USA**



- THIS BOOK HAS BEEN WELL APPRECIATED BY OEMS, DEALERS, LIGHTING COMPANIES, ARCHITECTS, CONSULTANTS, USERS, STUDENTS ....
- RECOMMENDED AS TEXT BOOK FOR B.E. (ELECT.) BY MUMBAI UNIVERSITY



**LIGHTING ACADEMY,  
ITALY**



# Power Crisis.....

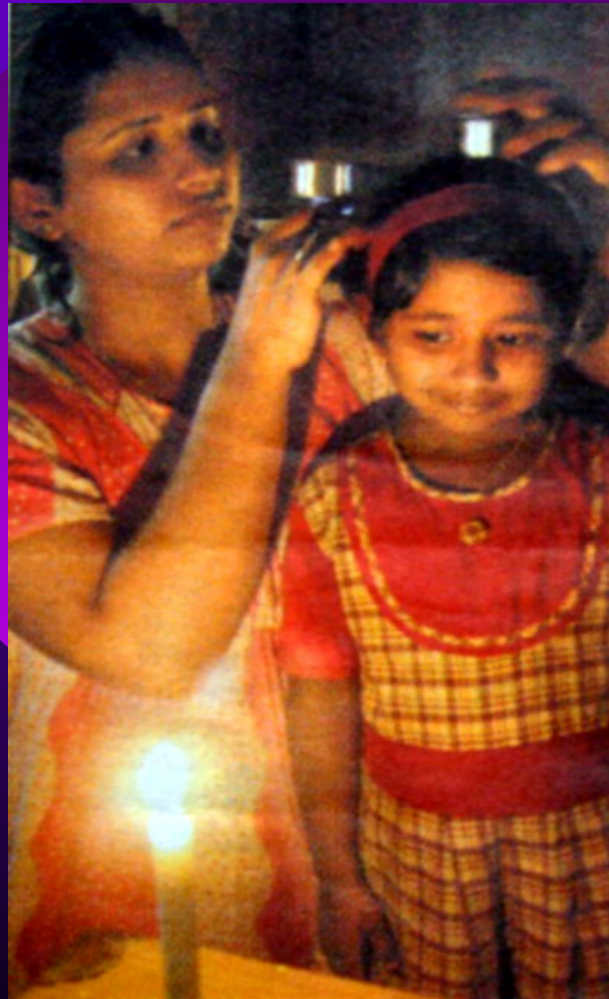


# FIRST TARGET

**“.....is lighting, as it is the most visible form of energy consuming device”**



# Daily Routine – Candle Light



# Residents - Protest Against Darkness



# Examination Preparation



# Getting Stuck - a daily Hazard



# IT Companies cry foul over power cuts



**Power can Single handedly black out India Shining**





# Multiplex Staff arrested after black out



... a dark story of bad planning & Power Theft



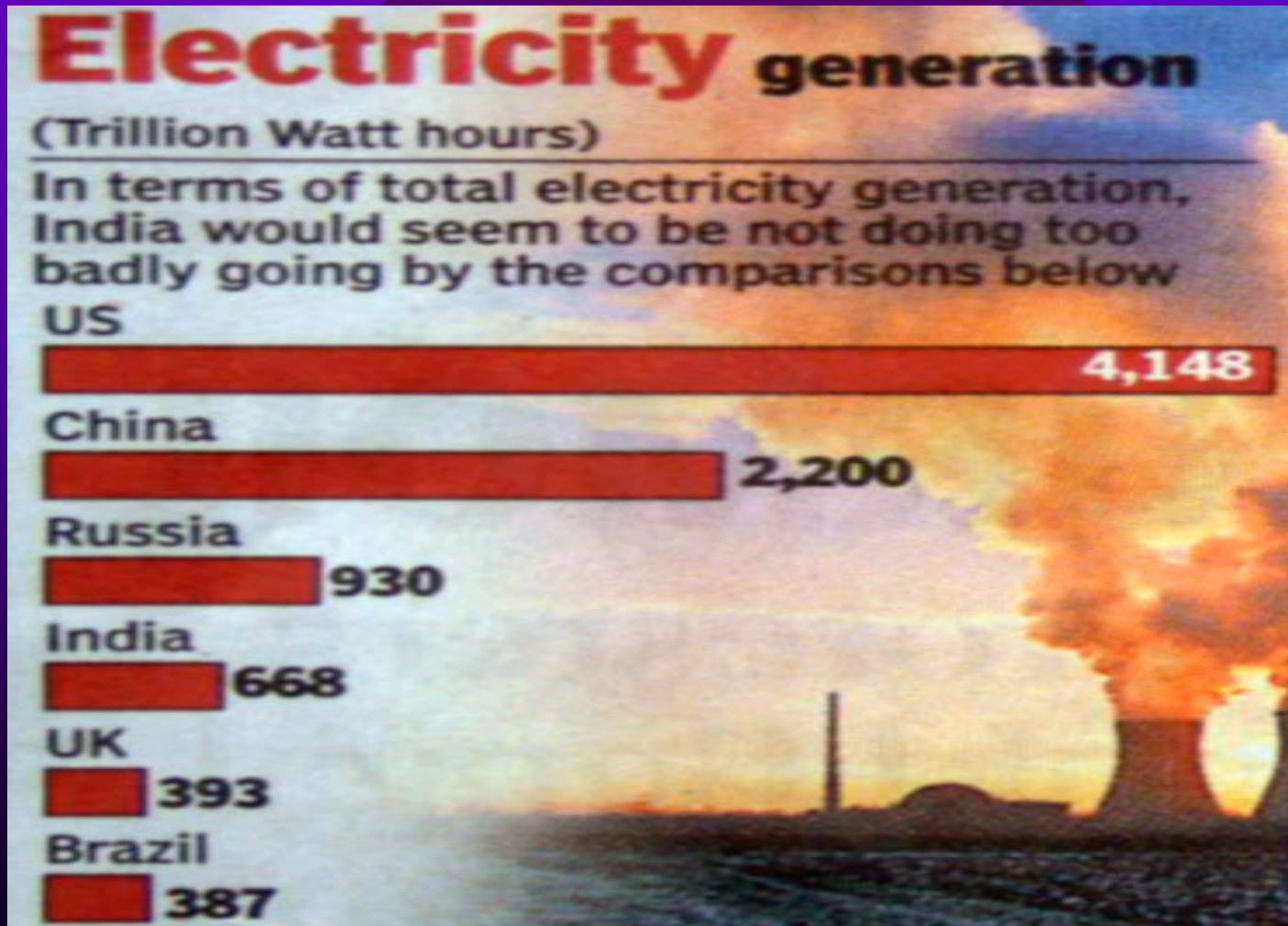
# Is It Right?

- To Switch OFF the Lights partly without realising that Lighting Standards are reduced, leading to poorer Working Environment
- To switch OFF the Lights totally – affects productivity, economy and health of people



# Electricity Generation

## World Scenario



# Electricity Consumption (Per Capita in Watt hours) World Scenario

## Electricity consumption

(2003: per capita in kw hours)

But compare India's per capita consumption with that of others and there clearly is a major problem

US



UK



Russia



Brazil



China



India



# INDIA

## Region Wise Status Of Demand & Supply Of Power (in MW) - Jan07

### REGIONWISE STATUS OF DEMAND AND SUPPLY OF POWER (IN MW) January'07

State	Demand for Electric Power	Availability	Surplus / deficit	Percentage
North Zone	29,344	25,062	-4282	-14.6
Western Zone	35,451	26,336	-9115	-25.7
Southern Zone	24,344	22,800	-1544	-6.3
Eastern Zone	9,923	9,446	-477	-4.8
North Eastern Zone	1,176	1,054	-122	-10.4
India - as a whole	1,00,238	84,698	-15,540	-15.5



# INDIA

## Region Wise Status Of Demand & Supply Of Power (in MW) - Jan07

### DEMAND, SUPPLY AND DEFICIT OF POWER IN DIFFERENT STATES

(April 2006 to January 2007)

State	Demand for Electric Power	Availability	Surplus / deficit	Percentage
Maharashtra	17,130	12,557	-4,573	-26.7
Chhattisgarh	2,257	1,817	-440	-19.5
Gujarat	11,619	8,110	-3,509	-30.2
Madhya Pradesh	8,090	6,404	-1,686	-20.8
Diu-Daman	210	187	-23	-11.0
Dadra-Nagar Haveli	415	370	-45	-10.8
Goa	433	400	-33	-7.6
Andhra Pradesh	9,167	8,281	-886	-9.7
Karnataka	6,130	5,611	-519	-8.5
Kerala	2,713	2,648	-65	-2.4
Tamilnadu	8,609	8,449	-160	-1.9



# Load Shedding A Compulsion & Not A Solution

- **Urban Areas 3.5 to 5 hours**
- **Semi Urban (Town) 6.5 to 8 hours**
- **Rural Zone to 14 hours**







Lighting Is For  
People  
& Not Empty  
Spaces



# *Recommendations*

- *Curb Power Theft*
- *Increase Generation*
- *Bring in Competition*
- *Energy Audit & Implementation*
- *Education in Energy Management*



# Lighting Energy Audit

## The Need of the Hour

- **Lighting Accounts for 25 - 30% of the Power Consumption in Commercial Establishments & Shopping Malls**
- **Energy Audit & Remedial Measure Implementation can reduce Lighting Power Consumption up to 50% in Commercial Establishments & Shopping Malls**



# Energy Saving Objectives

- First to provide adequate visibility & visual satisfaction with quantity & quality of illumination
- Second to achieve the same with minimum consumption of energy.



# Misconception

- CFL Lamp Saves Energy
  - ..... But With Respect To What?
  - GLS Lamps (Provided Right Lamp Is Used With Proper Luminaire)
  - Not Linear FTL Lamps – T8 /Tri Phosphor Or T5



# Misconception

- CFL Lamp Saves Energy

..... But When power factor is poor

....Energy Supply Company is the sufferer.

and it is National Loss too.



# Misconception

T5 Fluorescent Lamps Are More Energy Efficient  
.....But With Respect To What?

- Linear FTL Lamps T12/T8 (Halo Phosphor Type) & Associated D Type Ballast (Circuit Watt > 45W) For 36W Lamp
- Not w.r.t. T8 (Tri Phosphor) Lamp & Associated A1 Or A2 Type Electronic Ballast



# FTL Data

Lamp Type	Lamp Power	Lumen Output	Luminous efficacy
T12 (/54)	40W	2450	61 Lm/W
T8 (/54)	36W	2450	68 Lm/W
T8 (/82 or 84) + HF	32W	3350	105 Lm/W
T5 (/84) + HF	28W	2600(at 25°C) & 2900 (at 35°C)	93 Lm/W (25°C) & 104 Lm/W (35°C)





# Facts

- Real Advantage Of T5 Lamp (Max. Lumen Output At 35°C) Is Through Specially Designed Optics In Slim Luminaires
- In Other Words It Is Advantageous When Used as System Based And Not Retrofit Based



# Misconception

**“Daylight Is Free”**  
.....But.....

**To Tame The Daylight In A Way One Wants To  
Use .....Is An Expensive Proposal  
(In Terms Of Capital Investment)**



# Misconception

**“LED is Energy savings”**

.....But.....

**.....as on date is An Expensive Proposal  
In Terms Of Capital Investment**



# Worked Example on LED Down Lights

<b>Data</b>	Electricity Cost (cent/kWh)	\$0.10
	Light ON/Day (hrs)	4

Reference Brand	Type	Watts	Lumens	Lumens / Watt	Price/ Bulb	Annual Operating Cost	Life (Hours)
GE A19 long life	<b>Incandescent</b>	57	765	13.4	\$0.75	\$8.32	1500
n:vision	<b>CFL</b>	14	900	64.3	\$1.46	\$2.04	10000
Pharox 60	<b>LED</b>	6	336	56	\$40.00	\$0.88	50000

Reference: MapAWatt Blog



# Worked Example on LED Down Lights

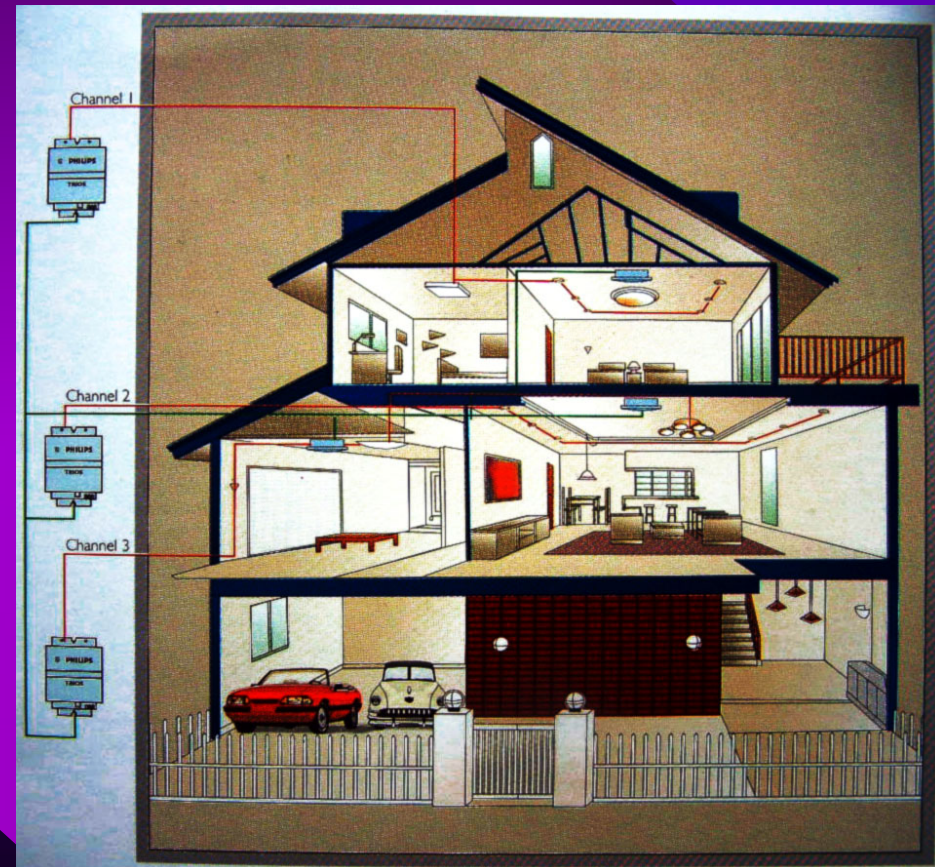
Analysis					
"Years"	Hours On				
10	14600	Bulbs (round up)	"Years" elec. consumption (kwh)	Elec. Cost	Total Cost (electricity + cost/bulb)
	Incandescent	10	832.2	\$83.22	\$90.72
	CFL	2	204.4	\$20.44	\$23.36
	LED	1	87.6	\$8.76	\$48.76

Reference: MapAWatt Blog



# LIGHTING CONTROL

- The control of light in all its aspects, from artificial to natural to sunlight, is one of the key issues which are changing the form of buildings today.



# Energy Effective Design Parameter

not

$\text{W/m}^2$

but

$\text{W/m}^2/100\text{LUX}$

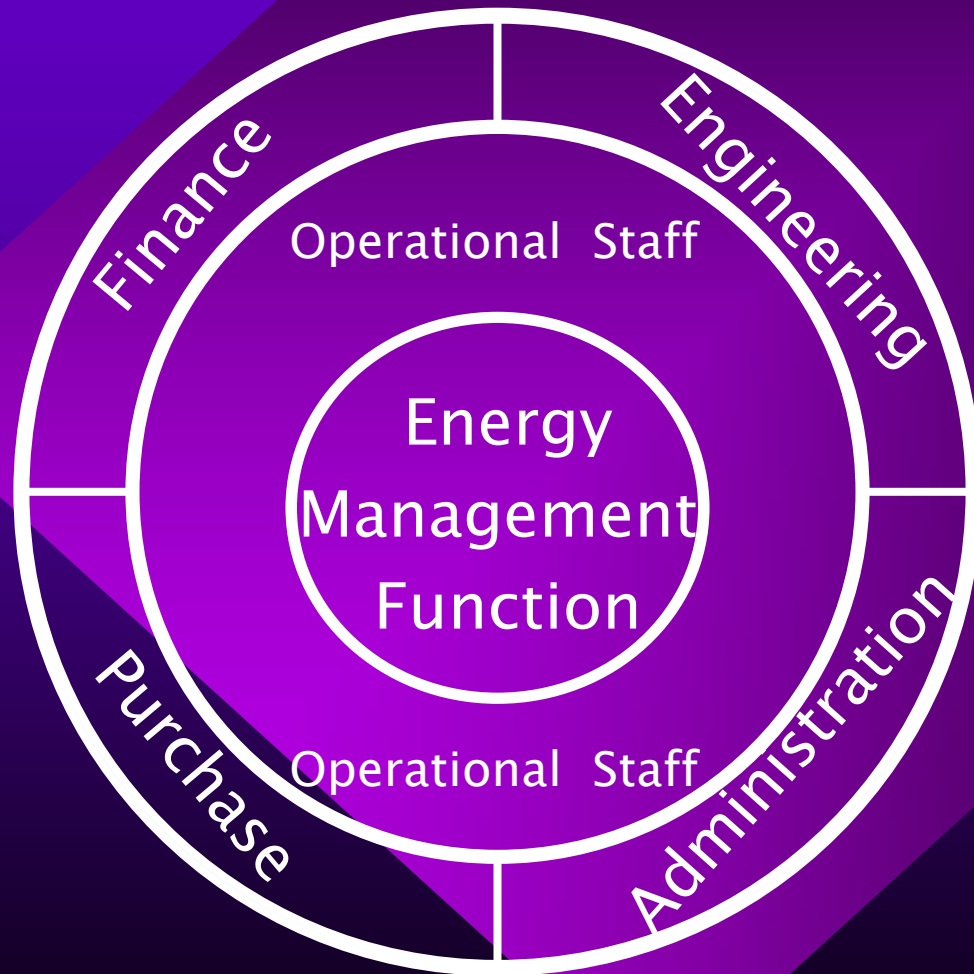
&

**Units consumed/Year**

- BEE to revise ECBC 2007 based on above



# Energy Management





# Energy Management In Lighting

- To Provide Right Light (In Terms Of Quantity & Quality) At Right Place, At Right Time & At Right Price (Capital Cost May Increase But Annual Cost Will Be Less) With Minimum Usage Of Electrical Energy.



Therefore, Education On  
Energy management in  
Lighting is necessary



# Proposal

- Introduce ***12 Credit Certificate Course on Energy Management in Lighting.***
- Recommended Modules
  - Language of Light & Lighting
  - Hardware of Energy Efficient Lighting Technologies
  - Lighting System Design & Simulation
  - Energy Efficient Lighting Management



# 12 Credit Certificate Course on Energy Management in Lighting

- Guide Syllabus
- Eligibility and Target group
- Workshops
- Course Duration
- Examinations & Recognition
- Course Fees
- Course Material & Teaching Aid
- Training The Teachers
- Funding For Course Material



# Target group

- Consulting engineers (MEP), Specifiers, etc
- Engineers from government organisations, municipalities, electric utilities,
- OEMs & marketing companies, their dealers etc.
- Teachers from engineering, energy management etc.
- Electrical contractors
- Plant / maintenance / in house planning engineers, etc.,
- Students



# Workshops

- Four workshops on practical and Tutorial (3 hrs. each)
- Measuring illuminance, power required,
- lighting of various lamps and assess the colour temperature, colour rendering index, beam characteristics
- Practical analysis of LED Components & Systems
- Working out Lighting design options, Calculating payback period of different systems, & selecting best energy efficient systems,
- At the end of each Module there will be a questionnaire and participants are supposed to solve this.



# Course Duration

- Part Time
  - Evenings or weekends for benefit of practicing professionals
- 120 hours of teaching,
  - Workshop, Practical & tutorial etc.
- 6 months Duration



# Teaching Aids

- Teaching aids must be standardised & must be prepared by the experts in form of
  - Power Point Slides,
  - Course Material
  - Demonstration Kit
- Teachers must be trained on all India basis





# Course Fees & Recognition

- Course Fees
  - Equivalent to Euro 500
- Recognition
  - Certificate
  - Member of Lighting Society
  - **Auditor of Energy Efficient Lighting - (BEE)**



# Funding for Teaching Aids

- Cost for preparation of standard Teaching Aids like Course Material & Power Point Slides & Training the Teachers is estimated as Euro 50,000
- Funding from
  - Ministry of Education,
  - Ministry of Power - BEE,
  - ELCOMA
  - World Bank



# Conclusion

- BEE to take lead and Introduce **part time** Certificate Course on Energy Management in Lighting
- Mandatory for Lighting Energy Auditors
- For Others to understand & implement energy effectiveness in lighting installations.
- Establish technical network between Educational Institutes, Lighting Industries, Standardisation Bureau, Government Policy Makers and planners.
- Establish an Institute on Energy Management in lighting including a Laboratory & Application Centre





**Thank You**

