



**LIF at the ARC Show 2011**

# **Welcome**

**The Lighting Industry Federation (LIF)  
Seminar Programme  
@ ARC 2011  
12<sup>th</sup> and 13<sup>th</sup> January 2010**



## LIF at the ARC Show 2011

- Day 1 - Wednesday 12<sup>th</sup> January:
  - 11.15 - Seminar 1 = Do you know what you don't know?
  - 14.15 - Seminar 2 = LED's – what's the latest?
  - 16.00 - Seminar 3 = Turning off the streetlights?
  
- Day 2 – Thursday 13<sup>th</sup> January:
  - 11.15 - Seminar 4 = Are you in control of your lighting?
  - 14.15 - Seminar 5 = How much energy does lighting use?



# LIF at the ARC Show 2011

- Format:
  - Two Presentations per Seminar
  - Q & A session at the end of each Seminar
  - Presentations will be published in PDF form on our websites:
    - LIF website [www.lif.co.uk](http://www.lif.co.uk)
    - ICEL website [www.ice1.co.uk](http://www.ice1.co.uk)
  - If you would like to know more about LIF or follow up on the Seminars, please visit us on **Stand G30**



# LIF at the ARC Show 2011

## How much energy does lighting use?

The view from the Carbon Trust – and some of the measures they are taking to reduce lighting electricity use

John Aston – LIF Consultant



**Our mission  
is to accelerate  
the move to  
a low carbon  
economy**

**Cutting carbon now by:**

- ▶ Providing specialist advice and finance to help organisations cut carbon
- ▶ Setting standards for carbon reduction

**Cutting future carbon emissions by:**

- ▶ Opening markets for low carbon technologies
- ▶ Leading industry collaborations to commercialise technologies
- ▶ Investing in early stage low carbon companies

# What does the Carbon Trust do in lighting?

- Cutting carbon **now**
  - Publications & training
  - Advisory services
  - Enhanced Capital Allowances (ETL)
  - SME loans
  - *Implementation solutions pilot*
- Cutting carbon in the **future**
  - Low Carbon Building Accelerators
  - Entrepreneurs Fast Track
    - e.g. Lomox (OLEDs)
  - Monitoring solid-state lighting development

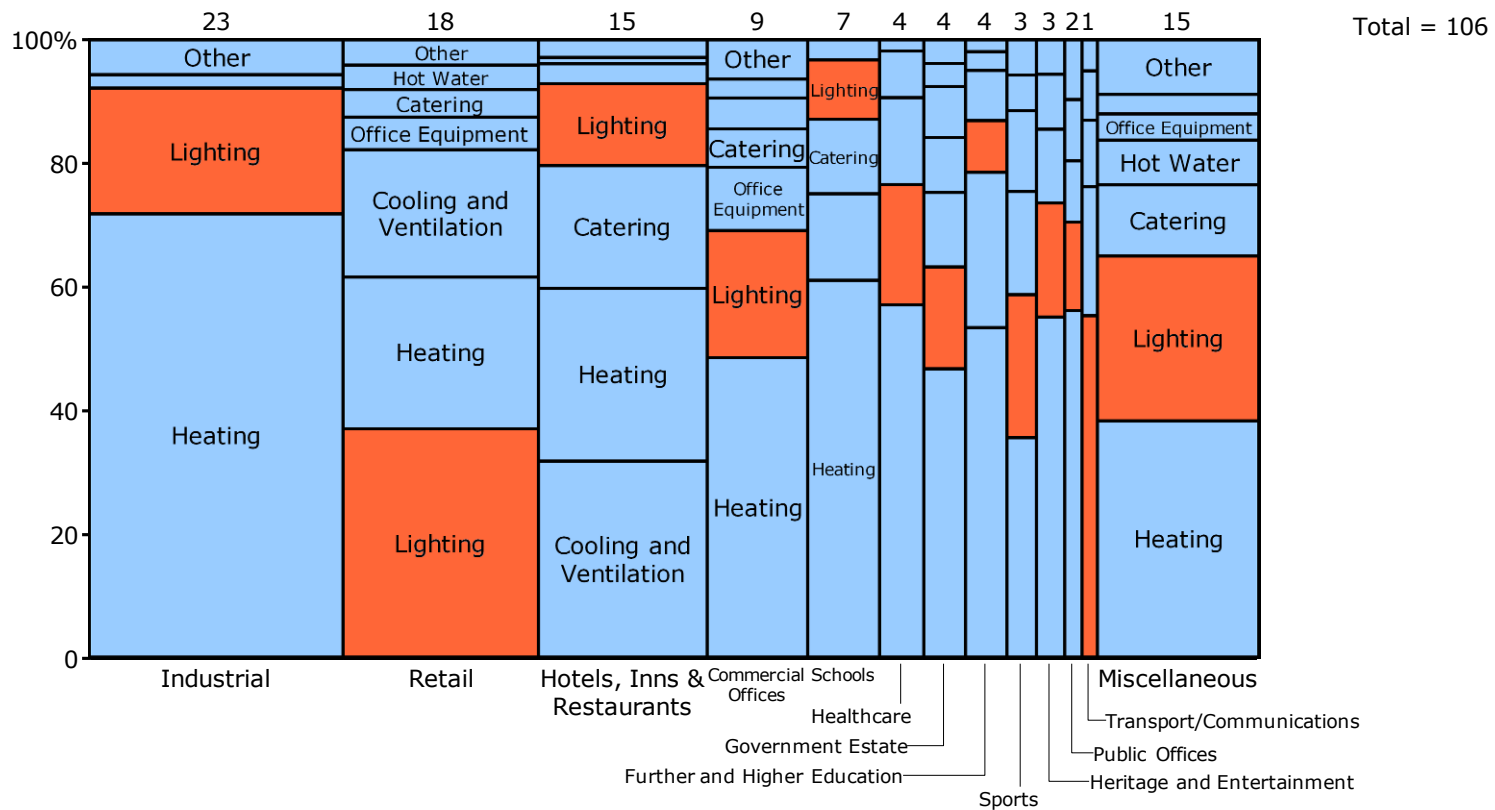
# How much energy does lighting use?

- Lighting accounts for around **20% of total UK electricity use:**
  - Over 70% in industrial & commercial applications, with the balance in domestic.
- On average, 25% of an organisation's electricity costs come from lighting, but it can be up to 40%.
- Energy efficient lighting can cut these costs by up to 1/3, reduce your carbon footprint & improve the working environment for your staff.



# Lighting is responsible for 24 Mt CO<sub>2</sub> emissions

## Emissions by building type and end use (Mt CO<sub>2</sub>)



Source: BRE, Carbon Trust analysis

Note: Industrial does not include industrial process



# Building the future, today

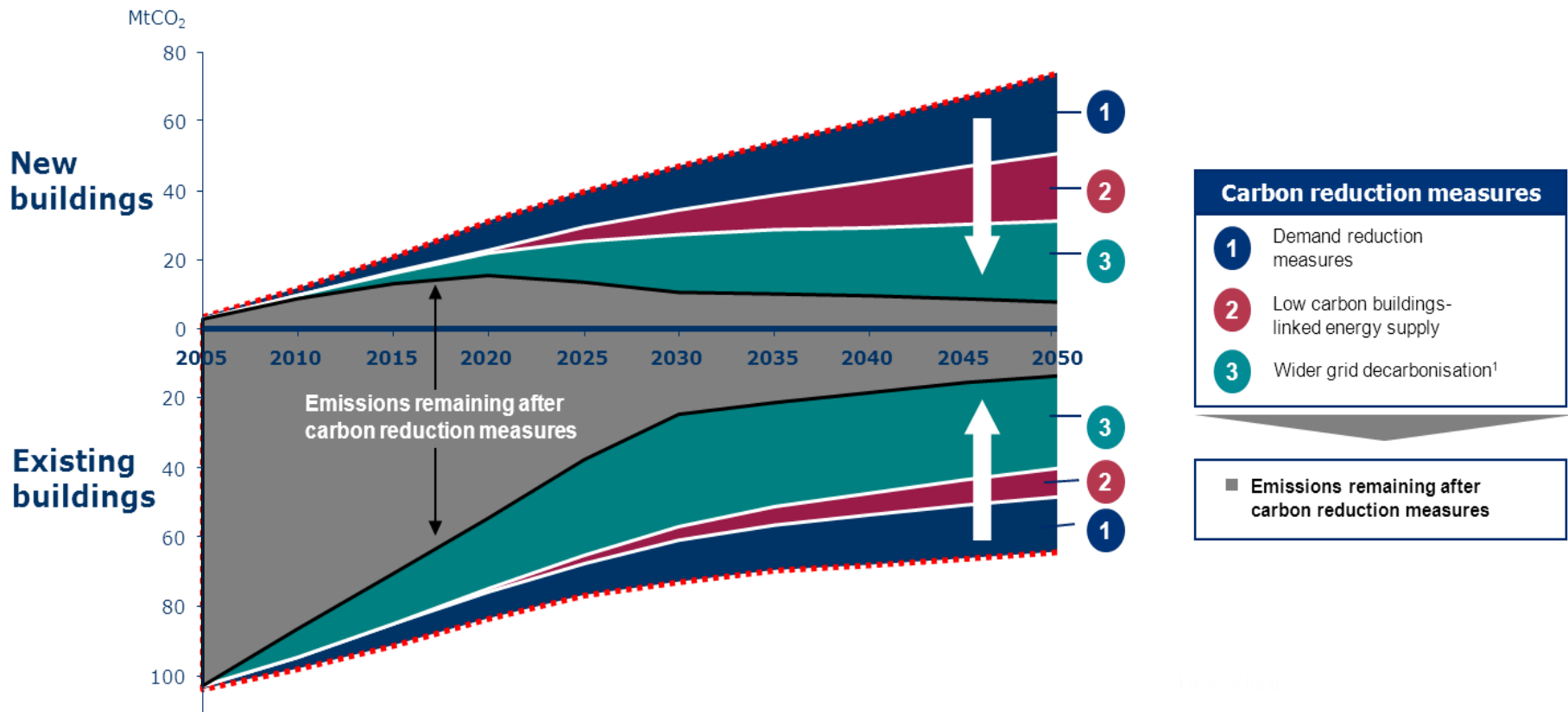
- Transforming the carbon and economic performance of the buildings we work in



# Building the future, today

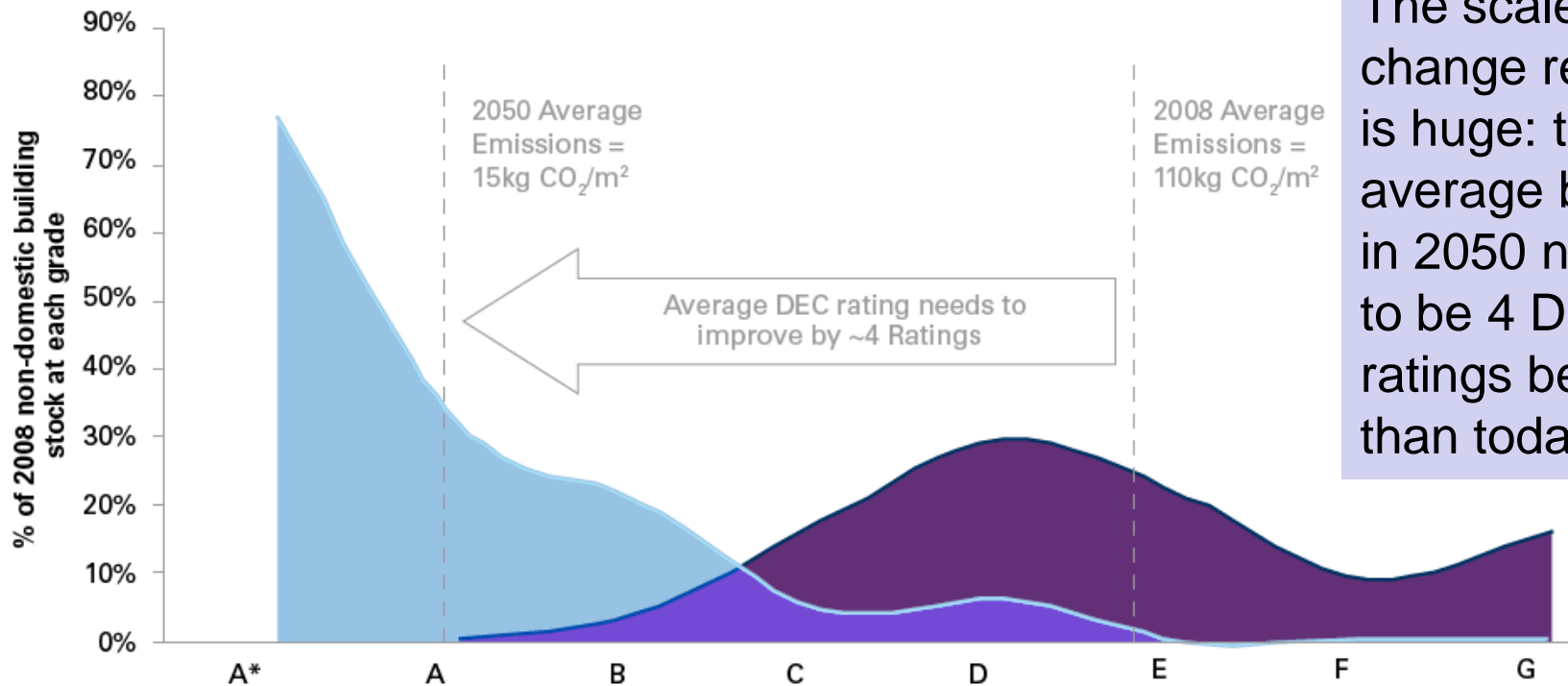
“What would a carbon reduction target of at least 80% mean for non-domestic buildings in the UK?”; both in terms of government policies needed to deliver it, and subsequent action from industry.

# Target achieves 80% carbon reductions by 2050 at the lowest cumulative cost



<sup>1</sup> Excludes offsite low carbon buildings energy supply that is connected to the grid  
 Note: Carbon dioxide emissions savings are normalised across all interventions  
 Source: BRE and Arup (data); CCC, Arup, Carbon Trust (analysis)

# Transforming energy performance



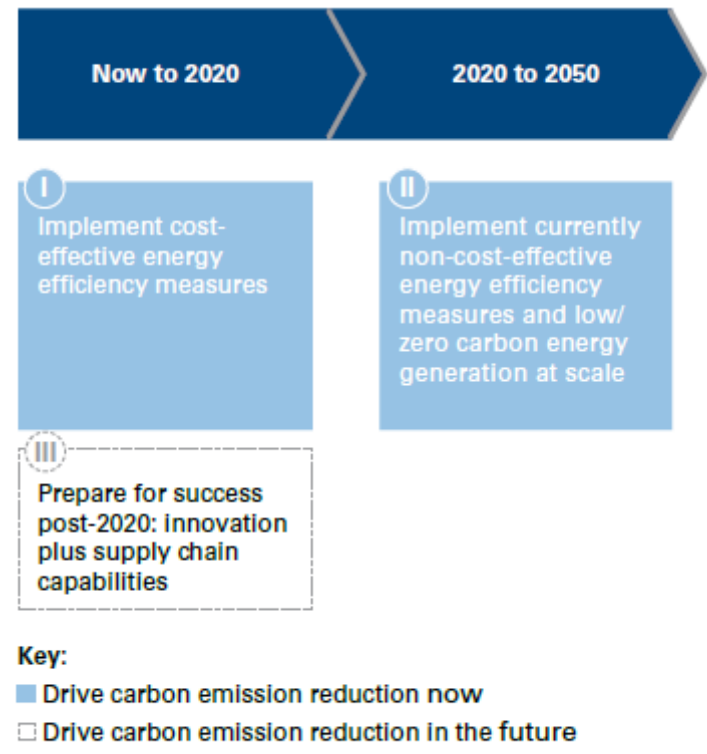
The scale of change required is huge: the average building in 2050 needing to be 4 DEC ratings better than today

	A*	A	B	C	D	E	F	G
2008 Carbon distribution	0%	0.1%	2%	10%	24%	22%	12%	29%
2050 Carbon distribution	0%	19%	36%	14%	26%	2%	1%	1%

■ 2008 DEC distribution ■ 2050 DEC distribution

# Big opportunity, big challenge

- A transformation of the buildings industry is required, along with government policies to overcome the large number of barriers to more low carbon buildings



# What does the Carbon Trust data say about lighting energy efficiency?

- Lighting energy reduction recommendations
  - 43% IRR (average)
  - 2.2 year simple payback (average)

BUT...

**Only 28% uptake of lighting recommendations**

# Low carbon building accelerators

- New & refurbished buildings, mainly non-domestic
- Accelerate low-carbon technologies & approaches
  - Demonstrate the **business case**
  - Identify **barriers** & present **solutions**
  - Reduce the **data gap** in research & policy

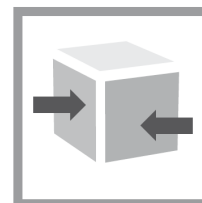
**Prepare**



**Design**



**Construct**



**Use**





# Insights from real projects



# Largest operational building study since PROBE

- 9 low carbon **refurbishments**
  - Running since 2005
  - Encouraging take-up of low-carbon measures
- 19 low carbon **new build**
  - Running since 2006
  - Projects going beyond Part L (2006)
  - Funding from “large” stream of DECC LCBP
- Anecdotal, modelled & measured data through full project life-cycle

# Where are we now?

- 8 projects complete, 18 still in monitoring
- Influential for our design advice service
- Basis of our refurbishment guide
- Engaging with industry & clients

**CarbonBuzz**  
an RIBA CIBSE platform

**PropertyWeek.com**



**Building**

**LOW  
CARBON  
WORKPLACE**  
A Carbon Trust Enterprise

**CARBON  
TRUST**

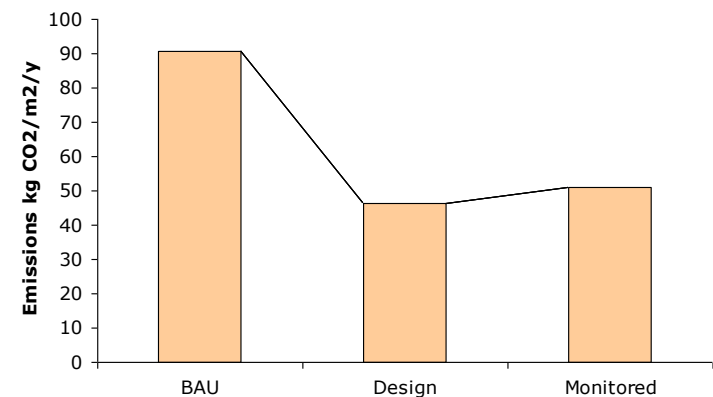
# Lighting – Mini supermarket

- 250m<sup>2</sup> shop in Leeds
- £360,000 budget
- Savings from lighting measures:
  - 14,000 kWh/year, £1,400/year  
or over 7 Tonnes CO<sub>2</sub>
- Cost £6,700
- Simple payback 5 years



After refurbishment

## Co-op lighting





# Emerging messages for lighting industry

- Lighting is a key element of low carbon refurbishment and new building projects
- There is a gap between low-carbon design intent & measured performance outcomes
- Commissioning failures are common and a key cause of carbon increases (e.g. over-ridden controls & Cat A fit-out clashes)
- Users often do not understand or maintain their lighting control systems
- Daylighting could be better used



**LIF at the ARC Show 2011**

**The Lighting Industry Federation (LIF)  
Seminar Programme  
@ ARC 2011  
12<sup>th</sup> and 13<sup>th</sup> January 2010**



# How much Energy does lighting use?

Iain Macrae MSSL- Thorn Lighting

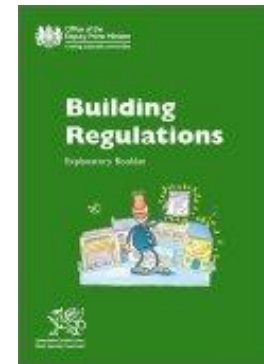
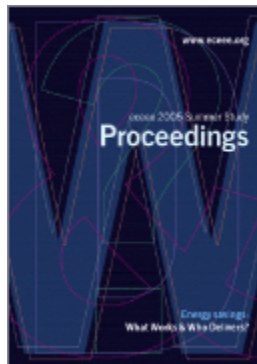




# Current legislation driving energy/CO<sub>2</sub> reduction

## What legislative drivers do we have?

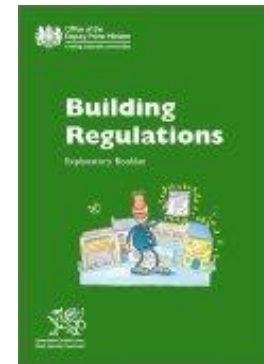
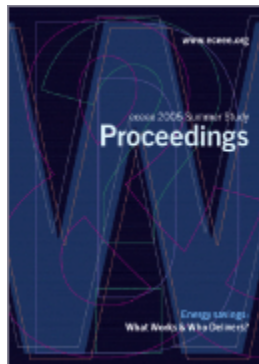
- Restrictions on available technology - Product based e.g. ErP
- Carbon Taxation - CRC Energy Efficiency Scheme
- Minimum performance - Building Regulations



## What legislative drivers do we have?

- Restrictions on available technology - Product based e.g. ErP
- Carbon Taxation - CRC Energy Efficiency Scheme
- Minimum performance - Building Regulations

But how effective are they?

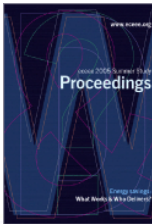


## ErP - Luminaire Packaging, Marking of Lamp Data

Effective date 1st September 2010

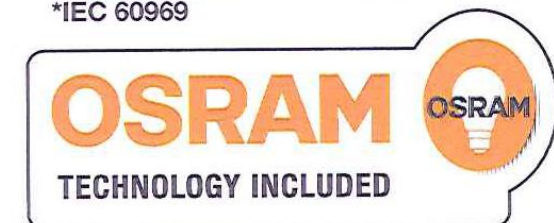
### Item 3.1, Annex II, EC Regulation 244/2009: PRODUCT INFORMATION REQUIREMENTS ON LAMPS

This requirement also applies to luminaires when lamps are included in the luminaire packaging.



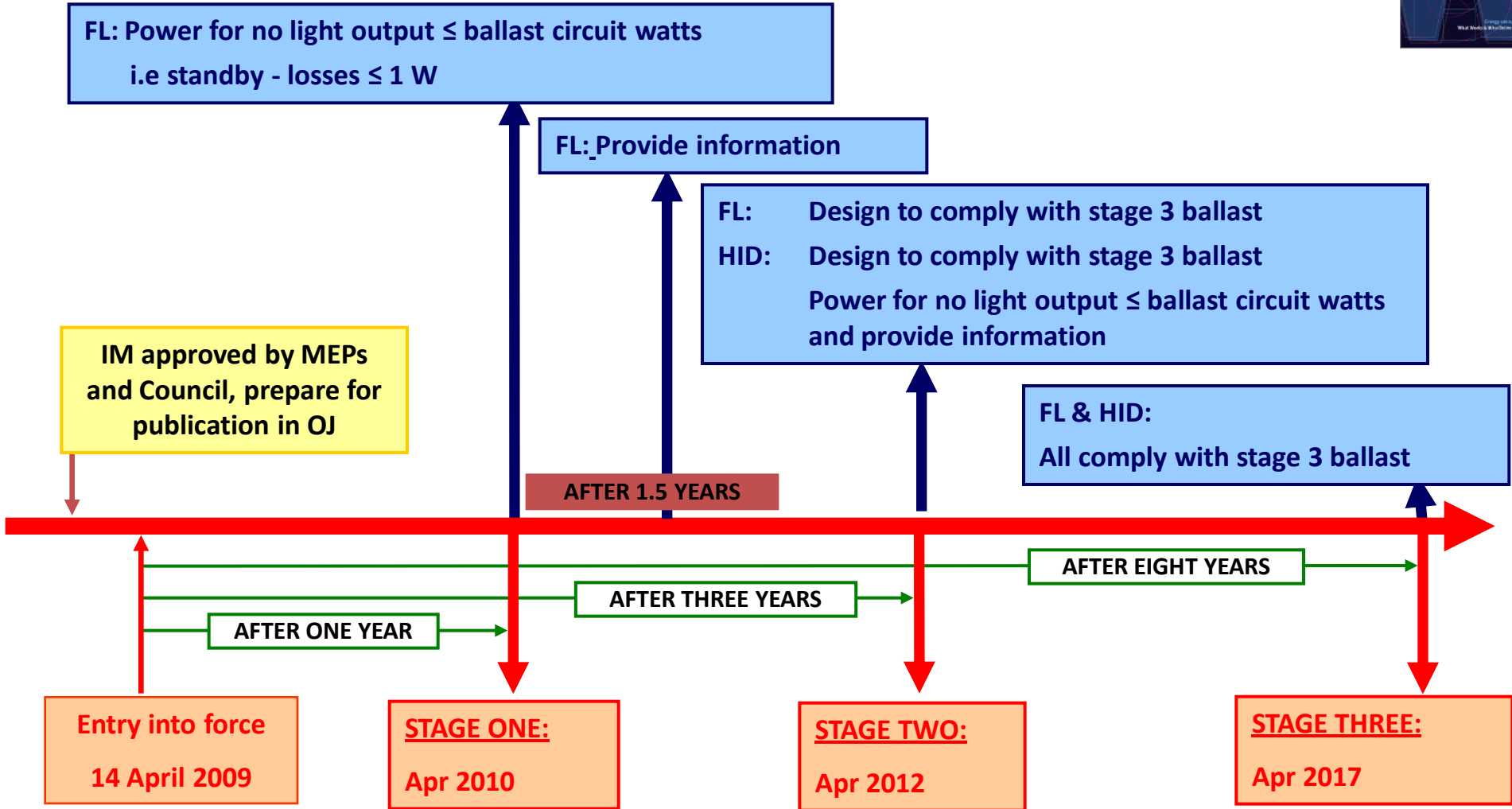
OSRAM DULUX® SUPERSTAR	
W	18 W
lm	1050 lm
T[Kelvin]	2500 K = warm comfort light
R <sub>a</sub>	100
	0 s = 100 %
	—
t[h]*	15000 h = 15 years (≈2.7 h/day)
	500000
Hg	0.00 mg
V · Hz	220-240 V · 50-60 Hz
	E27
<a href="http://www.osram.com/energysavers">www.osram.com/energysavers</a>	
<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="text-align: left;"> <p>18 W</p> <p><b>1050 lm</b></p> </div> <div style="text-align: center;"> <p>45 mm</p> <p>145 mm</p> </div> <div style="text-align: right;"> </div> </div>	

\*IEC 60969



# ErP - Luminaire Performance and Information, Regulation 245/2009

Effective 14th October 2010



## Tertiary Lighting Sector Implementation Measures for Luminaires

### Stage 1 – (14<sup>th</sup> October 2010) – Luminaire Information requirements

For luminaires for FL lamps with lumens > 2000 lm, provide information in technical file, website and other forms for each of the luminaire models –

- a) the efficiency of the embodied ballast (use ballast manufacturers data)
- b) the lamp efficacy (lm/W) of the embodied lamp (use lamp manufacturers data)
- c) if ballast or lamp not embodied give references to compatible types
- d) maintenance instructions to ensure original quality throughout lifetime
- e) disassembly instructions of the luminaire

### Stage 2 – (14<sup>th</sup> April 2012) – Information requirements

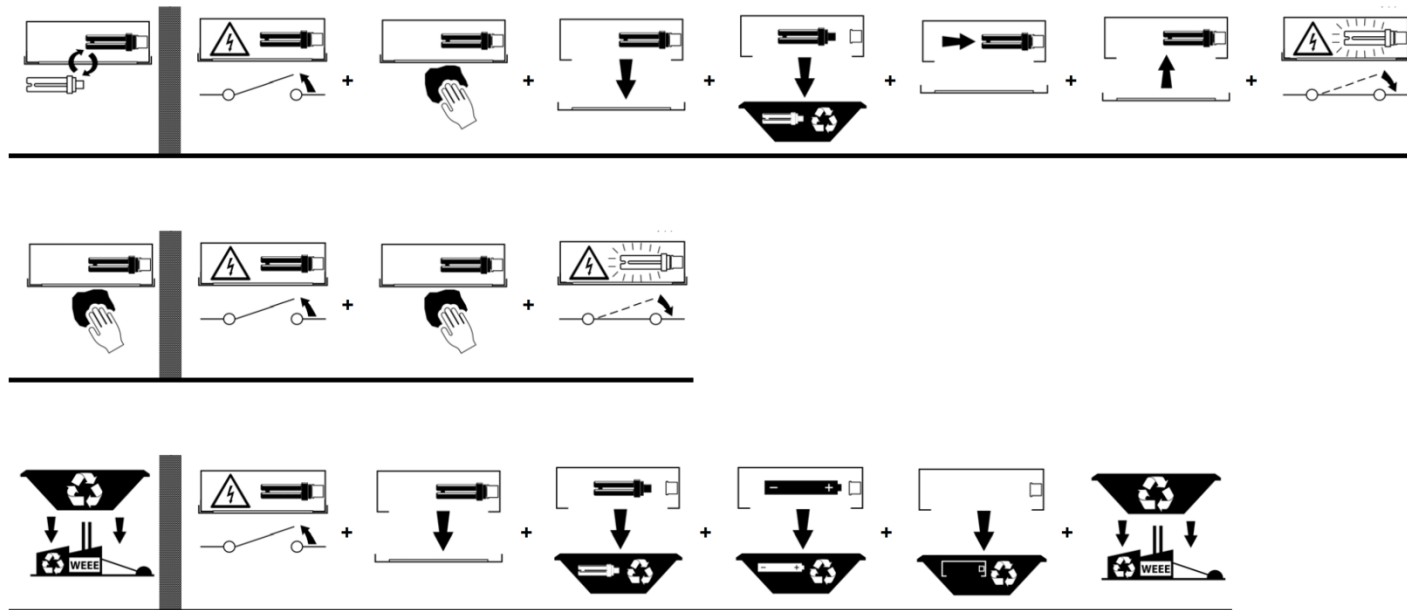
For luminaires for HID lamps with lumens > 2000 lm, provide information as above  
And f) for all HID lamp luminaires, that they are designed for either clear and/or coated lamps

# EuP/ErP Directive – Regulation 245/2009

## Luminaire Maintenance Requirements, Effective 14th October 2010

# THORN

Maintenance and disassembly instruction sheet  
Entretien et feuille d'instruction de démontage  
Underhålls- och demonteringsinstruktion





## CRC Energy Efficiency Scheme

- The CRC Energy Efficiency Scheme (formerly known as the Carbon Reduction Commitment) is the UK's mandatory climate change and energy saving scheme.
- The scheme started in April 2010 and is administered by the [Environment Agency](#).
- It is central to the UK's strategy for improving energy efficiency and reducing carbon dioxide (CO<sub>2</sub>) emissions, as set out in the [Climate Change Act 2008](#).



## CRC Energy Efficiency Scheme

- Aimed at improving awareness, energy efficiency and cutting emissions in large public and private sector organisations by changing behaviour and infrastructure.
- These organisations are responsible for around 10% of the UK's emissions.
- The scheme features an annual performance league table that ranks participants on energy efficiency performance.
- The scheme is designed to tackle CO<sub>2</sub> emissions not already covered by [Climate Change Agreements \(CCAs\)](#) and the [EU Emissions Trading Scheme](#).

## CRC Energy Efficiency Scheme

- Organisations are eligible if they (incl. subsidiaries) have at least one half-hourly electricity meter (HHM) settled on the half-hourly market. Organisations that consumed more than 6,000 megawatt-hours (MWh) per year during 2008 qualify for full participation and register with the Environment Agency.
- Organisations falling below the 6000MWh threshold have to make an information disclosure of their half hourly electricity consumption.
- Participants include supermarkets, water companies, banks, local authorities and all central Government Departments.
- Qualifying organisations will have to comply legally with the scheme or face financial and other penalties.



0.50	1.40	0.9192	1.90	0.9713	2.40	0.9918	2.90
0.66	1.41	0.9207	1.91	0.9719	2.41	0.9920	2.91
1.2	1.42	0.9222	1.92	0.9726	2.42	0.9922	2.92
1.8	1.43	0.9236	1.93	0.9732	2.43	0.9925	2.93
2.4	1.44	0.9251	1.94	0.9738	2.44	0.9927	2.94
3.0	1.45	0.9265	1.95	0.9744	2.45	0.9929	2.95
3.6	1.46	0.9279	1.96	0.9750	2.46	0.9931	2.96
4.2	1.47	0.9292	1.97	0.9756	2.47	0.9932	2.97
4.8	1.48	0.9306	1.98	0.9761	2.48	0.9934	2.98
5.4	1.49	0.9319	1.99	0.9767	2.49	0.9935	2.99

## CRC Energy Efficiency Scheme

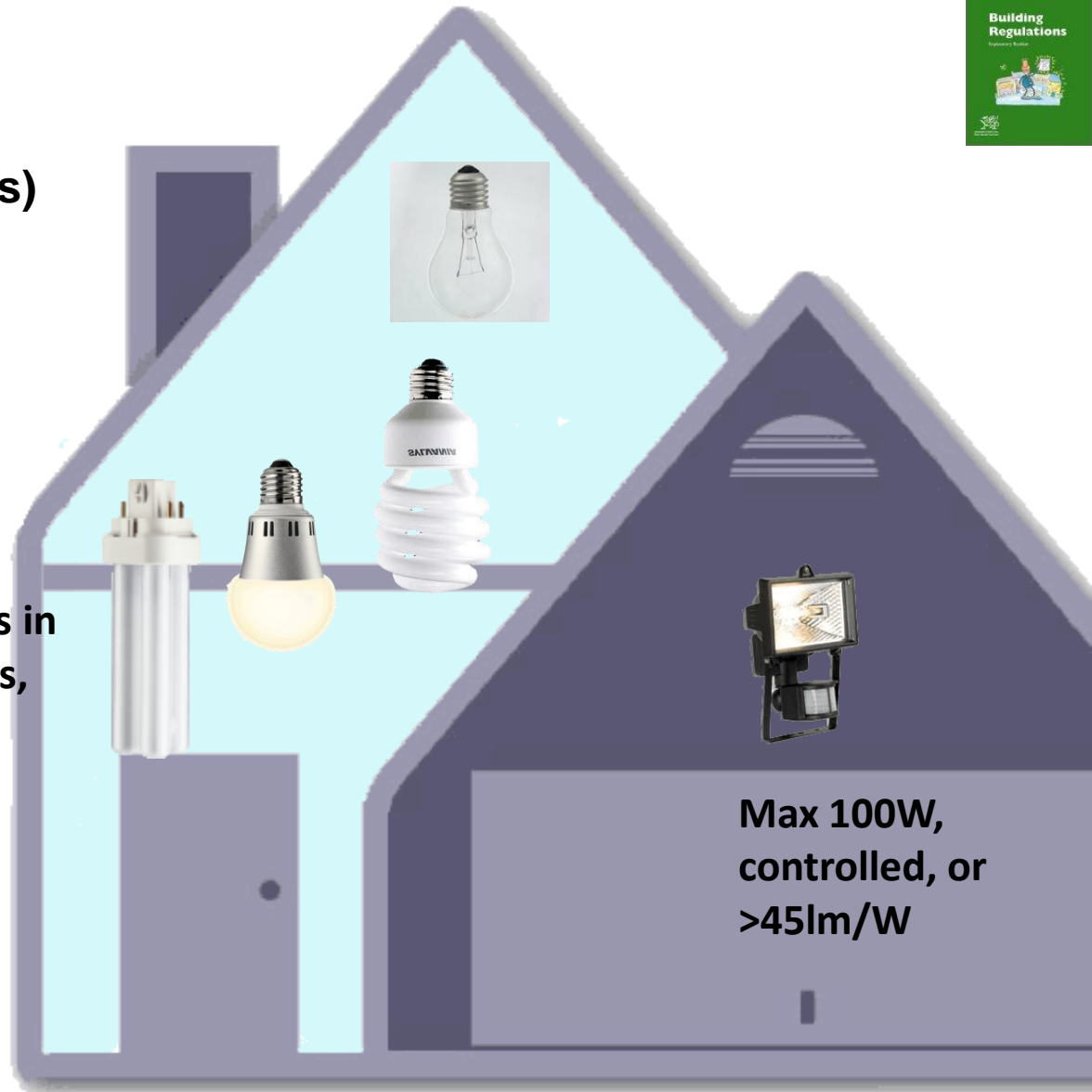
**UK Spending Revue 2010 - 2.108** The CRC Energy Efficiency scheme will be simplified to reduce the burden on businesses

- The first allowance sales for 2011-12 emissions now taking place in 2012 rather than 2011.
- Revenues from allowance sales totalling £1 billion a year by 2014-15 will be used to support the public finances, including spending on the environment, rather than recycled to participants.
- Further decisions are a matter for the Budget process.



## Part L 2010 (England & Wales) Came into force Oct 2010

**>45lm/W Light Fittings in  
the mains living spaces,  
over 5W**



**Max 100W,  
controlled, or  
>45lm/W**

**Domestic**



# Part L 2010 (England & Wales)

55 Luminaire Lumens/ Circuit Watt (LL/cW)



55lm/W



22lm/W

Non-Domestic



## Part L 2010

Table 45: Luminaire control factors for use in new and existing buildings	
Light output control	Control factor
a. The luminaire is in a daylit space and its light output is controlled by photoelectric switching or dimming control, with or without override.	0.9
b. The luminaire is in a space that is likely to be unoccupied for a significant number of operating hours, and where a sensor switches off the lighting in the absence of occupants but switching on is done manually except where this would be unsafe.	0.9
c. Circumstances a. and b. combined.	0.85
d. None of the above.	1.0

## Controls strategy



## Part L 2010

Table 46: Recommended minimum standards for metering of general and display lighting in new and existing buildings	
	Standard
<b>Metering for general or display lighting</b>	<ul style="list-style-type: none"><li>a. kWh meters on dedicated lighting circuits in the electrical distribution; or</li><li>b. local power meter coupled to or integrated in the lighting controllers of a lighting or building management system; or</li><li>c. a lighting management system that can calculate the consumed energy and make this information available to a building management system or in an exportable file format. (This could involve logging the hours run and the dimming level, and relating this to the installed load.)</li></ul>

### Metering strategy

## Part L 2010

**Table 47: Recommended controls for general and display lighting in new and existing buildings**

Space classification <sup>47</sup>	Control type
Owned	Manual by door
Shared	Flexible manual switching, e.g. local pull cords or wireless transmitter
Temporarily owned	Local manual switching*
Occasionally visited	Local manual switching*
Unowned	Time switching
Managed	a. Time switching; or b. centralised manual

## Controls Recommendations

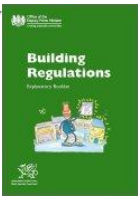
## Part L 2010



56 - 62LL/cW



62.5LL/cW

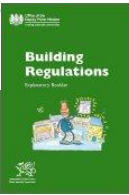


## But how effective are these?

- Currently over 60% of lighting in use is inefficient.
- With current technology most of these schemes can be improved making up to 40% savings.
- Product based or installed load energy reduction measures will save very little and will restrict flexibility of the scheme during usage.
- The right measure has to be energy usage based, such as LENI.
- This measure includes all – the efficiency of the product, the effectiveness of the scheme, the use of management controls and the true energy usage.



25kWh/m<sup>2</sup>/yr



## What are the savings?

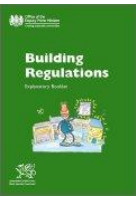
- Increasing luminaire efficacy in new build offers approximately 22% savings
- Increasing use of lighting controls and using efficient luminaires offers 64% savings dependant on building use and daylight strategy
- Increasing use of lighting controls will add in the short term to parasitic power, though the ErP will reduce this from 2017 onwards



← Luminaire efficacy gives 22% rise, saving 263kg CO<sub>2</sub>

← Controls could save 639kg CO<sub>2</sub>

← Controls and 22% rise could save 761kg CO<sub>2</sub>



## What else should be done?

- Clearly to tackle refurbishment will give biggest savings and is good for business. This is the objective of the EMILAS award.
- Currently offices are renewed at an average rate of 7% per year, road lighting at 3% per year.
- At these rates we will have many inefficient lighting installations in use for the next 10 to 20 years and unlikely to reach the 20% reduction agreed in the Lisbon protocol.



# LIF at the ARC Show 2011

**The Lighting Industry Federation (LIF)  
Seminar Programme  
@ ARC 2011  
12<sup>th</sup> and 13<sup>th</sup> January 2010**

**Thank You**