Sustainable Lighting Management

1. Scope
The Mechanical and Electrical Design Philosophy (9) details the University’s requirements for lighting. This should be referred to in all cases where guidance is required on Emergency Lighting and lighting specifications. For the purpose of this document Emergency Lighting will be excluded from the scope and users should refer back to M&E9 guidance.

2. Responsibility
Estates Services are responsible for all external lighting, fixed electrical distribution systems including light fittings. The department is responsible for emergency lighting, lamps and lighting controls.

Full details can be found at:
https://www1.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/estatesservices/oxonly/documents/regulationsandpolicies/Table_1_-_Responsibilities_for_R&M_inteiors_09.11.15.pdf

3. Guidance
When reviewing lighting the goal should be to provide a comfortable visual environment for the occupier to carry out their tasks whilst providing an energy efficient and sustainable solution. Achieved by:
- Good vertical illumination
- Low glare
- Correct colour temperature of lamps/LED
- Good colour properties (colour rendition)
- Efficient luminaires & lighting design
- Introduction of lighting controls

Should a department decide to progress with an upgrade, all lighting designs shall be submitted to the Estates Services Electrical section for approval at the earliest opportunity. No work should take place on site until the scheme and luminaire selection have been approved.

Lighting calculations to support the design shall also be provided where requested. All drawings submitted to Estates Services Electrical section shall have the following information:
- Luminaire description
- Luminaire efficiency
- Average lux level
- Uniformity
- w/m2/100 Lux

For queries on this please contact estatesbuilding.services@admin.ox.ac.uk
4. Lighting terminology

Lumen
A standardised unit of measurement of the total amount of light that is produced by a light source, such as a lamp or tube.

Luminaire Efficacy (lm/W)
The lumen output of the entire luminaire divided by the total power consumed by the lamps and ballast.

Lux
A standardised unit of measurement of the light intensity on a working plane (which can also be called “illuminance” or “illumination”).

Colour Rendition
Colour rendition defines the ability of a white light source to render colours accurately. It is expressed by the colour rendering index (CRI) with values from 0-100, with 100 being ideal. Daylight has a CRI of 100. The University of Oxford generally installs internal lighting with an index of >80.

Colour Appearance
The colour appearance of white light sources can be provided in a wide range of colour temperatures. The light emitted by a light source defines the visual sensation correlated to the ‘warmth’ or ‘coldness’ of light and is expressed in Kelvin. A warm colour temperature would be around 2700K-3000K whereas a neutral white would be ~4000K and a cold (bluish) white ~6500K. When installing replacement tubes these colour temperatures are stated on the side of the tube, along with their wattage and age.

Glare

Disability Glare - This affects the ability to see and is produced by high luminance in a low luminance scene. I.e. a spot light pointing into your eyes.

Discomfort Glare - Appears in the form of visual discomfort without affecting the ability to see. This is quantified by the Unified Glare Rating (UGR), typically UGR of no more than 19 for offices and 22 for reception desks.
5. Identification

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<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td><strong>Fluorescent Tubes</strong></td>
<td>• High lumens per circuit watt</td>
<td>• Cost of disposal</td>
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<tr>
<td>T5</td>
<td>• Reduced electricity costs</td>
<td>• Increasing cost of phosphor</td>
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<tr>
<td>T8</td>
<td>• Long Life – up to 20,000 hours</td>
<td>• Subject to premature failure through vibration and temperature changes</td>
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<tr>
<td>T12</td>
<td>• Reduced maintenance</td>
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<tr>
<td><strong>IF YOU HAVE T12 LAMPS PLEASE CONTACT THE BUILDING SERVICES TEAM WHO WILL LOOK TO REPLACE THE LIGHTING FITTINGS</strong></td>
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<tr>
<td><strong>Metal Halide</strong></td>
<td>• High lumens per circuit watt</td>
<td>• Contains vaporised mercury and metal halides such as Sodium Iodide</td>
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<td></td>
<td>• Life 6-15000 hours</td>
<td>• Slow start up time, not appropriate for PIR control.</td>
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<tr>
<td><strong>Light Emitting Diode (LED)</strong></td>
<td>• Lower energy consumption</td>
<td>• Glare can be an issue in some instances</td>
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<td>• Longer lamp life (50,000hrs)</td>
<td>• Many poorly designed products on market</td>
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<td></td>
<td>• Improved performance (wider more uniform beam spread)</td>
<td>• Integral switching methods often not possible (Remote PIR instead of integral etc.)</td>
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<tr>
<td></td>
<td>• Reduced maintenance</td>
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<tr>
<td></td>
<td>• Vibration resistant</td>
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<td><strong>Tungsten Halogen</strong></td>
<td>• Excellent colour rendition</td>
<td>• Create a lot of excess heat</td>
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<tr>
<td></td>
<td>• Smooth dimming</td>
<td>• Very low efficiency</td>
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<tr>
<td><strong>IF YOU HAVE THESE LAMPS, PLEASE CONTACT OUR SUSTAINABILITY TEAM FOR YOUR FREE REPLACEMENT.</strong></td>
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6. Control
Where possible, lighting should be switched off when not required. Depending on your use of space you may wish to retain a switch or invest in a more technical solution.

Two different sensors are used at the University of Oxford - passive infra-red and microwave.

The sensors are able to control the lights by a protocol known as DALI (digital addressable lighting interface) and these can be programmed in many different ways.

By using a simple handheld programmer we can programme the sensors to:

- Be either presence or absent detectors. (Absent is our default setting for offices)
- Set the correct light level so we only use what we need.
- Utilise the daylight sensor to increase efficiency.

7. Local Management
To ensure that lights are operating efficiently, ensure that office equipment is not blocking output. If shelves have been retrospectively erected, blocking a light fitting, remove the lamp to avoid excess energy consumption from lamps that are not required. Ensure that areas remain safe before doing so. Contact Building Services if fittings need to be moved to accommodate an office move.
Ensure that windows are cleaned regularly to make use of as much natural light as possible.
Ensure that diffusers are cleaned regularly to enable light to be dispersed efficiently.

Contact us

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Estates Services Building Services E-mail: buildingservices@admin.ox.ac.uk