Community Energy London

LED guidance

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Should groups have any comments on this guidance they should email directors@communityenergy.london

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1. Introduction

This guidance is for community energy groups looking to deliver a Light Emitting Diode (LED) project. It should be read in conjunction with the Step by Step Project Guide found on the CEL website, which sets out the different stages to delivering a project from start to finish.

This guidance on LEDs is full of information, tips, and tools groups can use to help them progress their projects. This guidance is not exhaustive but should give groups a good basis for their projects.

A list of contractors that groups have worked with before can also be found on the CEL website, to help groups when procuring various services.

The advantages of an LED project:

- LEDs are more energy efficient than other bulbs, LEDs use almost 90% less energy than incandescent bulbs, and 85% less than halogens
- They have a long life, some can last up to 50,000 hours
- LEDs will save site owners money on electricity bills and need to be replaced less often than other types of bulb
- By replacing a halogen with an LED you could save about 5kg of carbon/ bulb
- By replacing bulbs less often you reduce the quantity of material sent to landfill, and the quantity of raw material required to make the fittings
- LEDs are straightforward to install, no permissions are required to fit LEDs.

The disadvantages:

- With LEDs there is a higher upfront capital costs, compared to other, more traditional bulbs
- The quality of LED bulbs can vary
- In some environments, LEDs can overheat and fail
- The color from LED lights can sometimes become lower quality over time.

LED replacement projects are becoming an increasingly popular option for groups, and there are a few different models a group can choose from to take forward:

- A group may choose to deliver a standalone LED project involving a building-wide replacement of LEDs, or they may choose to install LEDs as part of a whole building retrofit of energy efficiency measures with the savings made from the installation of LEDS helping to finance other aspects.
- A group may either take on the responsibility of the entire LED retrofit and pay for the install of the bulbs themselves, or they may secure payment from the site owner, project

manage/ facilitate the LED project and receive payment for this through an agreement on the energy bill savings made.
- Alternatively, a group might find a company to install LEDs for free, who agrees to be paid back through the savings which are likely to be guaranteed. With this option, groups should be wary of any interest added on to the savings being paid back to the company, and should consider the bigger picture and how attractive this option is.

2. Suitable sites

A suitable site for an LED project is likely to have:

- a large number of lights in place,
- lights being used for long time periods (more than 8 hours a day).

Buildings with high electricity bills are also potentially good opportunities.

Meet with site owners. Find out:

- Can you get a copy of the site's electricity bills?
- Are the buildings electrics and ceilings in good condition?
- Will you need to replace light fittings?
- Are there any obvious barriers to delivering the project?

LED lighting projects work well in buildings where light quality is particularly important such as schools, universities and offices; however, groups should also consider opportunities in: leisure centres/gyms, community centres, care homes, warehouses, hotels, supermarkets and retailers, places of worship, and GP practices.

Once you have found a site you will need to secure it. Pure Leapfrog explains the various legal documents that might be required.

Additional Support:

- Check out Forum for the Future's tool 'Power Paired' to identify potential interested sites or contact your local council for an idea of what buildings might be suitable and attainable.
- Groups will sometimes have to make assumptions on a site's energy consumption when working out project feasibility, think about how the building is used at all times. The London Building Stock Model is a database of all the energy and carbon data collected through the Mayor's energy programmes and policies. It provides a snapshot of all London's buildings with information on their energy performance certificates and may be useful to groups.

3. Feasibility

When finding a suitable site for LEDs, groups will also need to complete an initial feasibility study. This will involve conducting a rough comparison of costs (including running costs) to savings.

Once a site is found and secured, a full feasibility study will then need to be completed before securing capital funding.

An independent energy audit/ lighting survey can help with the feasibility study, and could help you understand if there are other changes that could be made to the site, if you're looking to replace LEDs as part of a larger project.

Electrical testing tools, like clamp meters and energy loggers, can also help groups understand the energy consumption profile of a building.

Consider all costs and potential income/ savings to determine if the project is economically viable. Create a balance sheet.

Costs: Include the cost of: community consultation, energy audits/ surveys, feasibility studies, project development, the equipment and installation, access to lighting – e.g. scaffolding towers, making good, ongoing maintenance, running costs and a contribution to any community fund (if applicable) and any other expenditures involved.

Dealing with electric wiring, fixtures, and circuits must be left to a professional, in accordance with building regulations.

Income: estimate the potential bill savings for each bulb replaced, but also factor in savings on maintenance costs as a result of not having to change bulbs as often.

If at this stage the project looks unviable it must be stopped or re-designed.

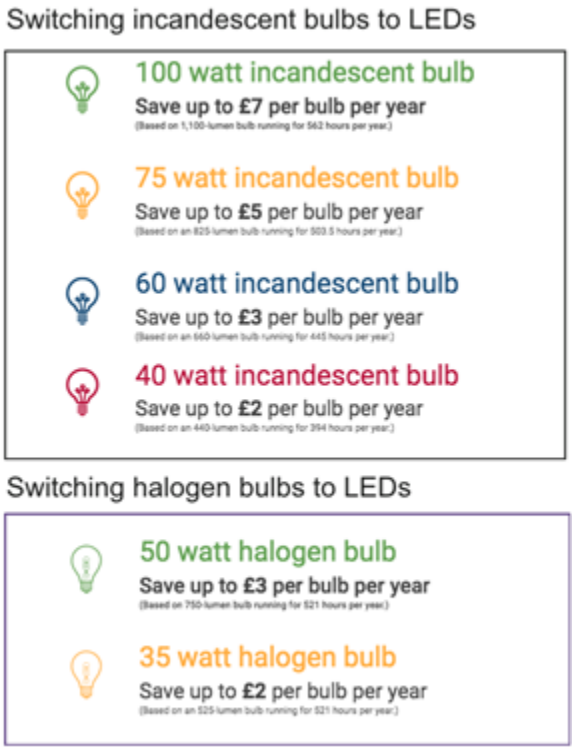
3.1 Calculating costs and savings

LEDs typically cost between £2.50-£12.

To estimate how much it will cost to run LED lights per day multiply the following:

- the running cost of a bulb, per hour (bulb wattage/ 1,000),
- the number of hours per day the lights are typically switched on for the site,
- the price paid for electricity per unit (p/kWh),
- the number of bulbs.

For savings, groups can also use an online LED savings calculator such as that provided by LED manufacturer Philips, or use the Energy Saving Trust's table (January 2021) which shows the approximate savings when moving from traditional bulbs to LEDs (see below).



Carbon savings: Groups can convert savings (measured in kWh) into carbon savings by using the Rensmart calculator.

CEL has more on calculating carbon savings in its Monitoring and Evaluation toolbox found on its website.

Additional support:

- CREW Energy has a template financial model for LEDs they would be happy to talk to groups about.

4. Operations and maintenance

Groups may decide to take on the responsibility for the operations and maintenance of the LED lighting for a defined period of time, including replacing failed bulbs. Groups should hence keep a track of all costs and income following the install as well.

Ongoing maintenance may not be straightforward, as it may require a need for scaffolding to access certain lights. Groups/ site owners may choose to replace bulbs one at a time or in bulk which will also have an effect on costs.

Alternatively, groups or site owners may choose to put an LED Lighting Service Agreement in place with a company.

Additional support:

- CREW Energy and SE24 have template Lighting Service Agreements they would be happy to talk to other groups about.
- Wrike, Google and Trello can all be useful tools for project management.
- Xero and Quickbooks can be used for accounting.

5. Decommissioning

As and when bulbs fail, it is best to recycle bulbs or see if there is a take back scheme where the bulbs were bought. Recycling LEDs ensures that the valuable materials in old bulbs can be re-used. Double check packaging to make sure bulbs can be recycled, as well as the local recycle bins or recycling depot to see where to discard bulbs.

6. How to choose LEDs

To determine what LEDs should be used, think about:

- Who are the users of the building,
- What are their needs now and in the future,
- Where is lighting needed,
- Are there architectural features you want to bring attention to?
- Do you want to create a mood?
- Do you want special lighting zones, for example if certain areas are used more than others.

6.1 Measurement of light and colour

Traditionally the power of a lightbulb is measured in watts. However, the measurement of light is lumens. The higher the lumens, the brighter the LED bulb.

- A traditional 40-watt incandescent bulb is equivalent to a 470 lumen LED bulb.
- A traditional 100-watt incandescent bulb is equivalent to a 1,520 lumen LED bulb.

The colour of light is measured in degrees Kelvin (K).

- Daylight is 5,000k
- Cool white is 4,200k
- Warm white is 2,700k

‘Soft white’ or ‘warm white’ provides a cosy glow, best for homes.

‘Cool white’ or ‘pure white’ is ideal for offices/ an area that requires clear vision.

There is also another colour measurement for LED bulbs, the colour rendering index (CRI). This measures the quality of a light source compared with sunlight. Sunlight is given the maximum CRI value of 100. The closer a lamp is to that, the better its ability to show true colours.

It is advisable to buy one bulb to try out, before replacing all bulbs. Sourcing the right bulb can be a challenge.

6.2 Swapping like for like

LEDs are 85% more efficient than halogens and 90% more efficient than incandescents. The table below shows how bulbs compare at different wattages.

LEDs	Halogens	Incandescents
Watts	Watts	Watts
4	30	40
8	60	80
12	100	120

6.3 Lumen depreciation and guarantees

The light of the LED will reduce over time. The L70 rating of a bulb tells you how many hours the bulb should give you an acceptable level of light intensity. An L70 of 50,000 hours is the current average rating for domestic LEDs. The better the L70 rating, the longer your LEDs will light to a safe standard according to current regulations.

Bulbs will come with guarantees, typically for 3-5 years.

Consider purchasing higher quality bulbs with longer warranties for the lights in hard to reach places.

Don't just buy cheap LEDs. Better quality bulbs will last longer, provide a higher manufacturing standard, and perform as they say they should on the box.

6.4 Beam angle and shape

Beam angle and the shape of LEDs will also differ. The angle of light can be all around, a narrow beam or a spotlight for instance.

What you choose to install might be down to personal preference, what looks best aesthetically, or what is most suitable for the building or the bulb's purpose.

6.5 Light fittings

LEDs can fit into most existing light fittings however, whilst this will cost less it can affect the lifespan of fittings and/ or bulbs, or might draw more power from the LED causing it to flicker, especially where LEDs are used with dimmers.

6.6 Controls

Bulbs can be turned on and off via a switch or be controlled using smart controls. LEDs with smart controls can be turned on and off remotely by an app or by voice. They can be controlled in groups and/ or by: timers, GPS, motion sensors, whether the building is in use, or the amount of daylight. These control systems can allow further savings to be achieved, however they will cost more initially.

LEDs may need a piece of circuitry called a driver; however, some compatible LED varieties are designed to work with the existing ballast technologies found in most fluorescent or HID fittings. An electrician should be able to advise groups further on this aspect.

7. Case studies

Doddington and Rollo Community Association (DRCA), Battersea: All of the DRCA's rooms require continuous artificial lighting and as a result the Association had been suffering from high electricity bills, spending thousands of pounds each month. By installing LEDs, CREW Energy managed to save the DRCA £600-£700 per month (an 18% saving on their electricity bills), as well as 116MWh, and 29 tonnes of CO_2 annually. The money saved goes towards repaying the loan to pay for the LEDs and also into a community fund to support other projects.

Whittington Park Community Association (WPCA), North Islington: Power Up North London (PUNL) replaced all the existing lighting at the WPCA's centre with LEDs. The project delivered an annual electricity saving of 6.4MWh and delivered CO_2 emissions reduction of 3.5 tonnes per year. WPCA should also save at least £720 a year on electricity bills. As LED lights

can last for years before they need replacing, WPCA will also benefit from a saving in the time and resources required to replace failed lights, many of which are very hard to access and take time for staff to replace.

Groups should make sure they understand early on when work can be carried out on site:

- Community buildings are very busy with multiple users, so planning is key.
- In schools, for instance, you may only be able to access the site after hours and in the holidays.

The CEL map shows all CE groups projects in London. LED projects can be found under energy efficiency.

8. Further resources

- Energy Saving Trust's Guide to energy efficient lighting
- CSE's Advice leaflet on lighting
- Lighting guidance from the Church of England
- Which?, LED lights explained

9. Version control

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