

## Public Buildings

### LED lighting in Hanham Wood Academy



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<b>Purchasing body:</b>	Cabot Learning Federation
<b>Contract:</b>	Retro-fit of LED lighting in secondary school Awarded: Spring 2017
<b>Savings:</b>	<ul style="list-style-type: none"> <li>• 97.6 tons/year of CO<sub>2</sub> emissions saved</li> <li>• Primary Energy per annum saving of 0.5 GWh</li> <li>• Financial annual saving of €20,370</li> </ul>

#### SUMMARY

- Retro-fit of existing school buildings with LED lighting
- LED lighting installation had been identified as a savings opportunity
- Value of contract - €130,841: published July 2017; awarded August 2017: procurement process – request for quote
- Bid winner was Sustain and the product was Luceco

## Procurement Approach

As part of a drive to make Academy Schools within the [Cabot Learning Federation](#) (CLF) more environmentally friendly and energy efficient, the CLF applied for funding for the replacement of traditional fluorescent and incandescent lighting to low energy, low cost LED equivalents. A planned assessment was carried out and a proposal and subsequent mini-competition held to select the suppliers for hardware and installation. CLF appointed [Sustain Ltd](#) to carry out the assessment consultancy and subsequent procurement of the lighting supply and fitting.

The Cabot Learning Federation is one of the most mature Multi-Academy Trusts in the South West of England. The CLF currently sponsors 15 academy schools: six primary academies, seven mainstream secondary academies, an all-through academy and a Studio School. In addition the CLF has six sites in the East Bristol / South Gloucestershire area, and a primary and a secondary re-engagement centre serving the same area. Together CLF educate 8,000 children between the ages of three and 19.

A high level review of the lighting at Hanham Woods Academy (HWA) was undertaken as part of the SEEF<sup>1</sup> funding application process. The assessment recorded the number, type and location of the existing lighting arrangement and provided installation costs and energy savings based on a like for like replacement.

The design focused on the requirements of the building and its occupants, with a stakeholder group established and requirement and scope agreed by the Principal. The assessment also accounted for the lighting levels needed to perform individual tasks within the space. Once functional requirements had been established the design team modelled the lighting layout to identify the optimum quantity and output of different fittings, taking into consideration existing wiring arrangements. The balance between upfront installation costs and on-going operational costs within defined design parameters will be struck. There was a combination of lamp system and bulb only replacement. The work was carried out between 24th July and 28th August 2018.

The design process is listed below for clarification:

- Record dimensions, characteristics and use of each room.
- Confirm existing lighting types, fixings, quantities, switching and wiring arrangements.
- Identify and record potential installation and maintenance hazards to be mitigated at design stage and/or highlighted to contractors and maintenance teams.
- Market test different lighting types based on defined criteria.
- Model individual zones against [CIBSE LG05](#)<sup>2</sup> recommendations in Dialux lighting software.
- Produce final specification for lighting design and installation.

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<sup>1</sup> Salix Energy Efficiency Fund (SEEF) - Salix works in partnership with the Education and Skills Funding Agency (ESFA) to save academies money and reduce carbon emissions by funding energy efficiency improvements. The funding is provided via an interest-free loan which is paid back through the predicted savings on energy usage. The Salix Energy Efficiency Fund (SEEF) is available for all academies, including academy sixth forms and those in large Multi-Academy Trusts (MATs).

<sup>2</sup> Lighting Guide LG05: Lighting for education offers guidance on the lighting of all educational spaces. In addition to providing guidance on the lighting equipment and its positioning, LG5 considers other important factors such as the decoration and finishes of rooms, sightlines, positioning of lighting controls and access doors, all of which need to be taken into account from the earliest stages of the planning process.

## Life cycle costing

A detailed evaluation and review of existing lighting was carried out by energy consultants Sustain (see Annex 3). They produced an initial report showing current estimated usage and cost and assessed this against replacement with low cost LED lighting. This report showed the anticipated savings between operating costs and maintenance and service costs. Based on the life span of LED lighting over traditional fluorescent bulbs, there was a strong indication of extensive savings in a short period of time

## Tender specifications and Verification

### TECHNICAL SPECIFICATIONS

The project was to provide Cabot Learning Federation in response to the successful applications to Salix Energy Efficiency Fund (SEEF) at Hanham Woods and Frome Vale Academies.

The scope for lighting, cavity wall and plant room insulation submitted as part of the SEEF applications were based on high level assessments to outline the energy savings and ring fence interest free finance. These works produced a final specification and schedule from which a final appraisal was made by the Trust whether to take the project forward and provide the detail from which supplies and labour can be contracted.

The lighting design must exceed the minimum requirements of Health and Safety Executive and where possible and cost effective to do so meet CIBSE LG05 recommendations for lighting in Educational environments. To reduce risks associated with taking out a long term loan of this nature, energy savings needed to be optimised, maintenance considerations taken into account and above all the design should be fit for purpose. Product manufacturers should be assessed on quality and financial standards and provide a minimum 5 year product warranty.

### AWARD CRITERIA

Product manufacturers were assessed on quality and financial standards. They were required to provide a minimum 5 year product warranty.

## A regional approach to SPP

This project was discussed and appraised as part of the PIP network to establish if there was any possibility that other Council Member Schools could be involved. However, it was established that the funding was only available on a case by case basis and therefore, other than disseminating knowledge and experience of the Salix funding process and subsequent installation programmes, it was not pursued as an option.

The learning from this contract will be shared widely within the [Partners in Procurement Energy Network](#) (PIPEN). This project is a flagship project for the region in terms of LED lighting in

institutional establishments and one which the rest of the region can learn from. This develops a pool of learning across a range of diverse locations and situations.

## Results

### Environmental impacts

Headline statement: **97 tons of CO<sub>2</sub>** will be saved in 2017, compared to previous contract.

**Table 1: Environmental savings**

Tender	Consumption (GWh)	CO <sub>2</sub> emissions (tonnes/year)	Primary Energy consumption (GWh)
Benchmark (previous contract)	0.333	167.5	0.83
Low carbon solution (2017 tender)	0.139	70.00	0.35
<b>Savings</b>		<b>97.55 (58.23%)</b>	<b>0.48 (58.23%)</b>

#### CALCULATION BASIS

- CO<sub>2</sub> emissions for conventional electricity set at 0,503 kgCO<sub>2</sub>/kWh
- For primary energy consumption a PEF (Primary Energy Factor) of 2.5 was assumed for electricity produced from fossil fuels, and 1.1 for RES<sup>3</sup>
- Calculation made using the tool developed within the GPP 2020 project ([www.gpp2020.eu](http://www.gpp2020.eu)), and refined within the SPP Regions project. Available on the SPP Regions website.  
(More detailed calculation tables are included in the Annex below).

### Financial impacts

The financial impact was calculated based on both energy costs and ongoing maintenance costs, equating to an annual saving of €20,370.

The changes to the lighting were due to a full design exercise commissioned by CLF optimising energy efficiency, light output and layout. Installation cost savings were realised through material and labour cost reductions as a result of this.

<sup>3</sup> Source: Ecofys, Development of the Primary Energy Factor of Electricity generation in the EU-28 from 2010-2013, 2015

**Table 2: Savings calculations**

Lighting Type	Technology List type	Pre	Post	Install Costs	kWh Savings
T8 Fluorescent	T12/T8 to LED including ne	£ 271,167.60	£ 109,919.25	£ 109,575.94	£ 161,248.35
T12 Fluorescent	T12/T8 to LED including ne	£ 22,783.20	£ 10,640.70	£ 10,123.29	£ 12,142.50
GX24q	Compact Fluorescent to LE	£ 1,485.00	£ 798.00	£ 1,454.69	£ 687.00
GU10	Halogen to LED using same	£ 924.00	£ 168.00	£ 250.00	£ 756.00
SON-T	Flood lighting to LED includ	£ 14,850.00	£ 6,534.00	£ 5,580.00	£ 8,316.00
2G11	Compact Fluorescent to LE	£ 7,804.50	£ 3,386.25	£ 4,439.75	£ 4,418.25
SON-E	Flood lighting to LED includ	£ 3,003.00	£ 1,228.50	£ 1,868.75	£ 1,774.50
2D CFL	Compact Fluorescent to LE	£ 554.40	£ 324.00	£ 487.50	£ 230.40
T5 Fluorescent	T12/T8 to LED including ne	£ 8,778.00	£ 5,700.00	£ 3,800.00	£ 3,078.00
PAR38	Incandescent to LED using	£ 1,188.00	£ 144.00	£ 300.00	£ 1,044.00
EM 2D CFL	Compact Fluorescent to LE	£ 277.20	£ 189.00	£ 272.93	£ 88.20
<b>Total</b>		£ 332,814.90	£ 139,031.70	£ 138,152.84	£ 193,783.20

Due to the low energy consumption and the long life of LED bulbs, the maintenance costs have been significantly reduced. The anticipated costs for the first 8 years are calculated as being only €2,602.

## Social impacts

No formal study has been undertaken, but feedback by end users and other reports show that the installation of LED lighting provides the students and staff with a more natural lighting environment for classroom based lessons. According to a UK [Department for Education and Employment report](#), when teaching STEM (Science, Technology, Engineering and Mathematics) subjects, focused lighting helps concentration and visibility of finer tasks in laboratory areas. Other feedback has been that there is a more pleasant atmosphere and less exposure to unnatural light waves through the school day.

## Contract management

The Central CLF Estates team will monitor the contract although electricity bills will be monitored by Sustain Ltd and our contracted Energy providers (The Energy Consortium and Clifford Talbot Ltd) and where appropriate advice given to help meet and/or increase energy saving targets through behavioural change, bill reduction and best practice over the next 12 months.

As part of a drive across the Federation for environmental and financial efficiency, the success and benefits identified from this project, as well as understanding and consideration of technical know-how, will be communicated to all other sites where traditional lighting still exists. Subject to Salix funding availability or Federation improvement funds, it is anticipated that future project of this type will undoubtedly be undertaken in the future.

## Lessons learned and future challenges

Cabot Learning has a number of traditional school buildings and as a result has an increasing need to review and improve its lighting. The savings potential is without question and where we are able will be carrying out future projects.

#### Lessons learned:

- Scope and Benchmark fully, ideally using expert guidance and industry benchmarking data
- Monitor usage and savings
- Carry out user feedback on improved conditions, ensuring all users are consulted prior to project undertaking
- In future and where possible, search for and access appropriate framework agreements for potential vendors in order to make use of previous work undertaken. Don't under specify the requirement: at the time of bidding for funding, all requirements and opportunities were included
- Provide a comprehensive works programme to installer and product vendors

#### Future challenges:

- Availability of Salix (or similar) funding
- Adoption of Federation-wide programme of works
- Capacity to carry out multi-site installations
- Only real option for installation is August summer holidays, restricting the number of capable installers/suppliers where tenders and projects are not sufficiently planned.

#### CONTACT

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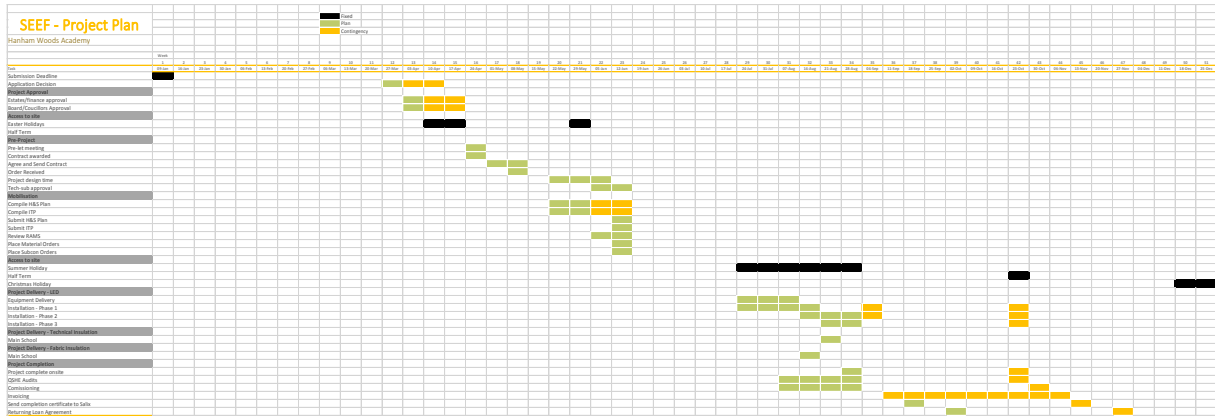


## Annex 1 - Calculation of environmental savings

Calculations made using the tool developed within the GPP 2020 project ([www.gpp2020.eu](http://www.gpp2020.eu)), and refined within the SPP Regions project.

Location of energy contracting	United Kingdom <input type="text"/>		
CO <sub>2</sub> -emissions per kWh electricity (kg/kWh)	0,503	If you know your own rate, enter it on the sheet "General Assumptions".	
Lifetime of the measures implemented in the course of the contract	10	years	
<b>INPUT DATA</b>			
Energy source	Baseline		Green tender
	Current annual energy consumption		Expected annual energy consumption
Electricity, conventional	332 815	kWh	139 032 kWh
Electricity, green		kWh	
Heating oil		l	
Natural Gas		m <sup>3</sup>	
Wood pellets		kg	
Wood		kg	
District heating		kWh	
Coal Briquette		kg	
Lignite high quality		kg	
Lignite low quality		kg	
Coke/Anthracite		kg	
			TOTAL
<b>SAVINGS</b>			
Expected results	Savings (Baseline / Green tender)		
	Per year	Per lifetime	Percentage
Primary energy savings, (GWh)	0,48	4,8	58,23%
Reduction of CO <sub>2</sub> emissions, (t CO <sub>2</sub> )	97,55	975,53	58,23%

## Annex 2 - Works Program



## Annex 3 – Lighting evaluation and review

Link to [Assumptions](#) table

Link to [Assessment and calculations](#) table



## About SPP Regions

SPP Regions is promoting the creation and expansion of 7 European regional networks of municipalities working together on sustainable public procurement (SPP) and public procurement of innovation (PPI).

The regional networks are collaborating directly on tendering for eco-innovative solutions, whilst building capacities and transferring skills and knowledge through their SPP and PPI activities. The 42 tenders within the project will achieve 54.3 GWh/year primary energy savings and trigger 45 GWh/year renewable energy.

### SPP REGIONS PARTNERS



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