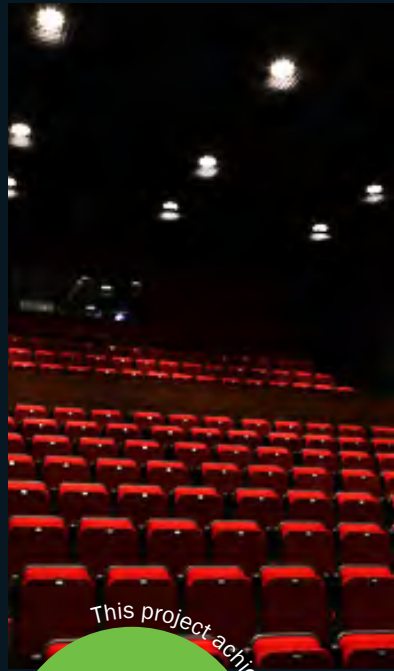
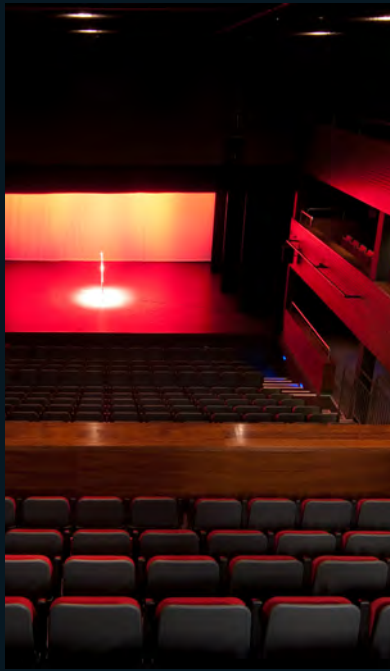


Case Study

The Berry Theatre



This project achieved
80%
energy cost
reduction



PhotonStar™



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Project

The Berry Theatre

PhotonStar™ Products

Olympus Basic

Key Issues

A theatre lighting project is extremely unique due to the following problems that need to be addressed:

- Maintenance
- DMX controlled
- Dimming (Single System)

Benefits of Installation

- Improved efficacy figures of 80% from 11.93W/m²/100lx to 2.25W/m²/100lx when comparing LEDs to their typical halogen equivalents in this application.
- 80% reduction in energy costs
- 50,000 hours operational life at high ambient temperatures (to L₇₀) leading to zero maintenance
- Payback period of 18 Months
- Single system—dimming and full brightness
- Unexpected lamp failures eliminated

application

PhotonStar were invited to supply a low energy lighting solution for the Berry Theatre, located in Hedge End, Southampton. The newly-built, 306 seat state-of-the-art building aims to be an inspiring and creative hub for both the artists and the audience. The Berry Theatre project successfully applied for the Government's 'Co-Location' funding scheme. The application was successful due to recognition that the theatre would serve multiple local stakeholders within the community, and allowed for investment into advanced technical equipment such as the LED solution from PhotonStar. 'The level of quality and technical specification achieved is the underlying success of the project.' (Architect Simon Waite and Theatre Consultant Richard Bunn, Theatres Magazine)

The theatre will be intensively used all year round, 16 hours a day, to present professional touring classics; live music; film screenings; new writing programmes and master classes; contemporary performances; technical theatre training; career support and as a centre for a local youth theatre group.

A theatre lighting project is extremely unique due to the following problems that need to be addressed:

- **Maintenance**
- **DMX controlled**
- **Dimming (Single System)**

With the Berry Theatre auditorium being 7.4m high, **Maintenance** is a challenging issue with the lights being fairly inaccessible (without disrupting the entire theatre), which incurs concerns over high costs and health & safety.

The lighting solution needs to be **DMX controlled**. DMX is a common control protocol for theatrical applications and can be used to control lighting effect in terms of their actual light (e.e. colour, intensity and focus) and their mechanical motion/position. DMX can also be used to control other theatrical effects such as foggers, screens, curtains etc. from a control desk.

Finally, **Dimming** is required in the theatre's house lights, as they are used by theatre staff to communicate about the production in process i.e. quickly dimmed house lights are commonly used as a cue for the audience to take their seats as the show is about to begin. The house lights need to be sufficiently bright at all times other than during the performance, so that the audience members can safely locate their seats, read theatre programs, move around the auditorium during the interval and safely exit after the show. During the performance the house lights aren't necessarily turned off completely, but are more commonly dimmed to a low setting. This is to allow the audience members to see their surroundings, leave the auditorium if necessary, and importantly allows theatre staff to monitor the audience and be aware of any medical emergency which may occur.

Theatres commonly use a two house-lighting solution: tungsten lamps are used for the house lighting as they offer full dimming to zero and fluorescents are commonly used for the setup lighting as they only really dim to about 25%, offering lower lighting levels and energy savings that aren't critical to a drama performance. This is more common in educational and commercial theatres where the space is frequently used for lectures as well as drama. In taking the decision to use LEDs, Berry Theatre are choosing a lighting solution which can be used for both applications (house and setup lighting), thus reducing energy savings and lamp replacement costs, whilst being able to be used on the protocol DMX system.

292
replacement
lamps



ZERO
lamps



97
man hrs



ZERO
man hrs



£15,732
of energy costs



£2,662



82.2
tons



13.9
tons



PhotonStar supplied a lighting solution consisting of 18 DMX controlled 8-head Olympus Basic high bay luminaires for the theatre auditorium area. The Olympus Prismatic with the Mercury 810 light engine achieves an efficacy figure of 2.25W/m²/100lx and the solution met all of the requirements in the initial brief:

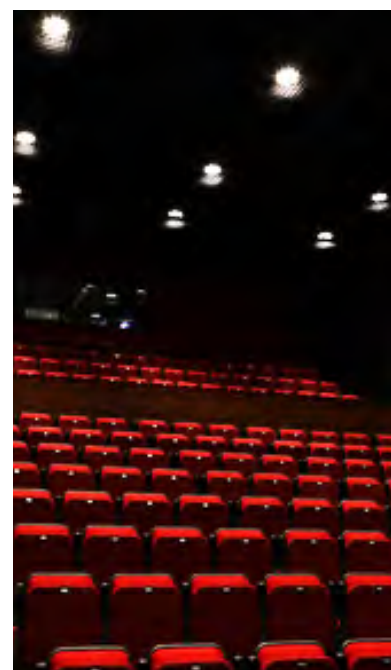
Maintenance is virtually eliminated due to the 50,000 hour lifetime of the PhotonStar LEDs which don't catastrophically fail but fade out gradually when coming towards their end of life - which allows for easier planning when carrying out maintenance.

This project enabled PhotonStar to alter some of the standard designs of its products in order to comply with their clients needs. Although the Olympus originally comes with an integral non-dimmable driver, PhotonStar were able to integrate a DMX controllable driver pack into a bespoke 8-head Olympus high-bay style luminaire in order to allow

better functionality in conjunction with the rest of the theatre's control system. By integrating the DMX driver into the LED luminaires, it gives the theatre staff total flexibility on dimming control.

The final luminaire design uses the DMX control to provide the theatre's lighting team with the ability to dim each of the Olympus luminaire's output from less than 10 emitted lumens through to 3368 emitted lumens at full output. To create this level of control the bespoke Olympus luminaire have three individually addressable/controllable circuits of light engines; 1 circuit with 1 engine, 1 circuit with 3 engines, and the last circuit with 4 engines.

By accepting a very slight step-dimming system, the Berry Theatre is now enjoying 80% energy savings, and virtually no lamp replacements or labour needed to maintain the installation - which has led to a very fast payback period...



solution



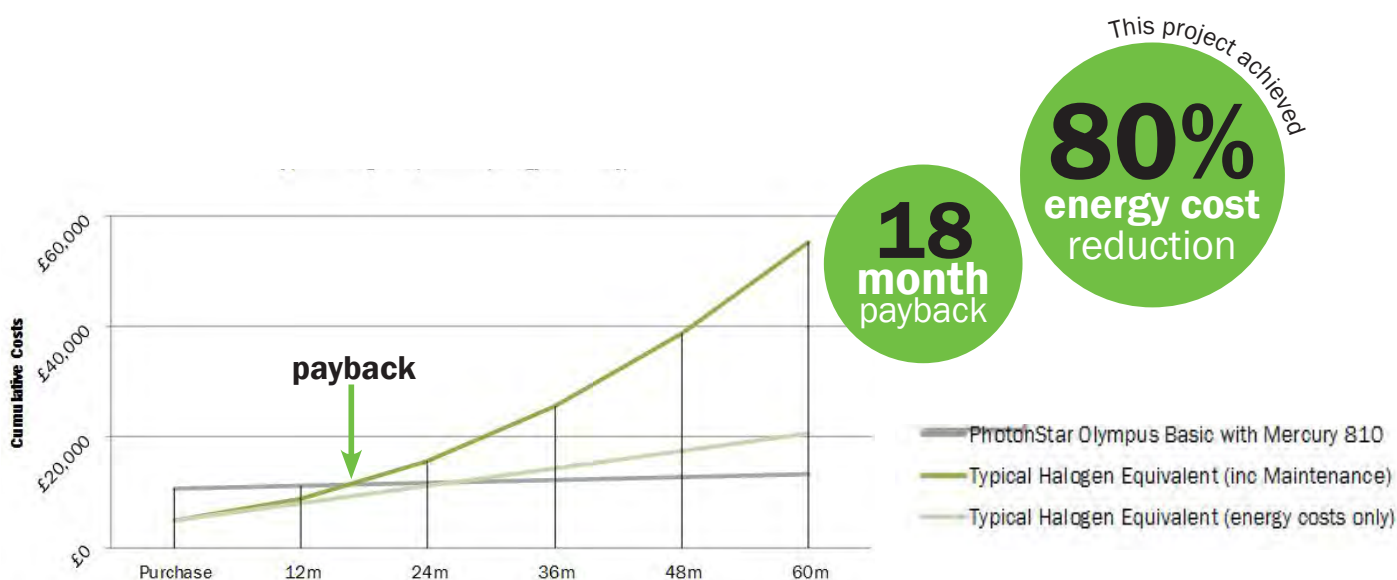
total cost of ownership

In order to look at the total cost of ownership of this project, we can compare the PhotonStar installation with a typical halogen equivalent (the Iguzzini M360 Reflex professional + DALI transformer). Calculations show a payback period of 18 months.

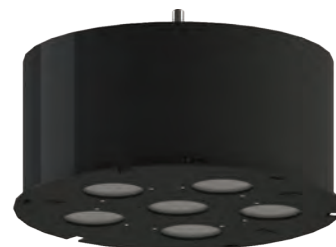
40 halogen fittings, plus a transformer would produce similar lux levels to the 18 Olympus fittings, and achieve an efficacy figure of 11.93W/m²/100lx on the same floor area (282.43m²) at full power - a difference of 80%. Within the payback calculations we have incorporated an anticipated annual labour cost increase of 4%

due to factors including rising fuel and insurance prices, and additional requirements for training and registrations (BCIS, the RCIS Building Cost Information Service). We have also incorporated an anticipated annual energy increase of 8.5% starting at 10p/kWh - a typical figure provided by the industrial energy prices in the EU, Eurostat Statistics in Focus and DECC.

Calculations show that over a 5 year period there would be an 80% reduction in energy costs and CO₂ emitted, and virtual elimination of any maintenance costs, when comparing the LED solution used to it's typical halogen equivalent.



*Assumptions over a 5 year period: 0.544 CO₂ per kWh, 16 hours use per day, 10p/kWh, lamp replacement cost £3.00, 3 lamp replacements per hour (20 mins per lamp change), anticipated annual lamp replacement cost increase 10%, anticipated annual labour cost increase 4%, anticipated annual energy cost increase 8.5%, Typical Halogen Equivalent fitting price £125, PhotonStar Olympus Basic fitting price £595



mercury
810

Olympus Basic

A High output high bay luminaire with tailored photometry for each application.

In this application a superior replacement for a typical halogen downlight equivalent. Can also replace metal halide and SON fixtures.

Zero maintenance allows for use in high or inaccessible areas

In this application a DMX controlled dimmable driver

In this application, output up to 5304lm (8x 663lm), and delivered lumens of 62.5lm/cW at full power.





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