

THORN
LIGHTING



**EDUCATION
REFURBISHMENT**

**ENERGY SAVING, CO₂ REDUCTION,
BEST LIGHTING FOR LEARNERS**



ENERGY EFFICIENCY, CARBON EMISSIONS, WORLD CLASS LEARNING ENVIRONMENTS

IS IT REALLY POSSIBLE TO ACHIEVE ALL THREE?

With energy costs rising and continuous efforts being made to make a positive impact to climate change, education facilities will undoubtedly look to find savings in both energy and carbon emissions.

Lighting can play a key role here but there lies the challenge, how can this be achieved without negatively impacting the learning environment?

With natural light improving the learning rate by up to 26%, when undertaking a refurbishment of an educational facility, it's important to consider controls to ensure the right balance of natural vs artificial light for the learners and teachers alike.

When it comes to moving to LED or upgrading existing LED lighting schemes, there are various ways to ensure maximum cost saving whilst enhancing the learning experience. This can be through the implementation of controls and sensors through to utilising lighting solutions designed with learners in mind.

In this short guide we talk about how you can achieve just that.

WHAT SHOULD YOU CONSIDER?

WHEN IT COMES TO REFURBISHMENT OF EDUCATIONAL FACILITIES IT'S IMPORTANT TO TAKE VARIOUS FACTORS INTO CONSIDERATION TO ENSURE THE BEST ENVIRONMENT FOR LEARNERS WHILST MAXIMISING THE OPPORTUNITY FOR ENERGY EFFICIENCY.

NATURAL LIGHT

An effective classroom lighting scheme should make use of any natural light that is available, with artificial light being added only where necessary. Why? Well a study by the Hescong Mahone Group discovered that students receiving high levels of natural light were achieving test scores up to 18% higher than students receiving minimal natural light. Of course it's not always possible to incorporate completely natural light into an existing classroom due to architectural constraints, and that's where there's other factors to take into consideration before pushing ahead with a new lighting scheme.

FLICKER

According to IES (Illumination Engineering Society), potential flicker-Induced Impairments can include reduced visual task performance, distraction through to headaches and fatigue. Fluorescent lighting can produce flicker of high frequency and whilst LED is not flicker free there is greater opportunity to reduce it through the implementation of controls.

It's important to note that the quality of the driver being used is the root cause of flicker. By using luminaires with quality drivers flicker can be reduced so looking at the driver's technical data can help to give you an insight! Unable to get this detail from the manufacturer? It's worth asking why! And don't forget we're here to help you navigate through your refurbishment project.

GLARE CONTROL

Ensuring visual comfort in areas and spaces where learners and teachers spend long periods of time is very important, both for the human eye and nervous system and it's even more important for children who are in a period of development. So this is where you should prioritise glare control when replacing the lighting within an educational facility. For instance, glare control is an important aspect when it comes to creating visual comfort and it goes without saying

that selecting a luminaire that favours low glare levels (UGR) and meets the EN12464:1-2023 standard is a must. Glare calculations/studies should be conducted, and simply looking at a datasheet or UGR table can give a false view and this is where we're here to help!

WHO IS USING THE SPACE AND HOW IS IT BEING USED?

Consider the activities being undertaken in a space. Is it hands on perhaps in a primary school setting, or are the learners concentrating on a laptop or interactive white board? Lighting should always accommodate the visual needs of the users, so it's important to plan the lighting scheme not just based on the size of the room but what is happening within it. We should also mention here BSEN12464:1-2023 which gives specific guidance for the lighting levels that are appropriate for the activity and users within a given space.

CONTROLS

When it comes to balancing natural and artificial light, we have both wired, wireless or even hybrid solutions to cater for the needs of any refurbishment project. These solutions can help to significantly reduce energy usage and carbon emissions whilst ensuring the light levels meet the different needs of those using the space.

COLOUR

The colour rendering index (CRI) relates to the human eye's capacity to distinguish colours in their truest form (i.e. as close to being viewed as it would in natural light). Classrooms should ideally have a CRI of >85 except for classrooms used for a specific task where colour can be key e.g. arts & crafts where it should be >90.

ACOUSTIC COMFORT

If good lighting is the first step toward good communication, then good acoustics is next!

Poor acoustics can reduce concentration and memory tasks which can be very detrimental to learners, whereas good acoustics can support communication and learning. The materials used for floors, ceilings and walls all have an effect on the acoustics in a room, as do the light fittings and any other installed equipment. Using a luminaire with an acoustic raft can save on the alteration of treating other surfaces in a room, such as concrete ceilings, plasterboard walls or solid wood

or vinyl floors. And that's where our Arena Symphony luminaire comes in!

EMERGENCY

Emergency lighting for schools cannot be overlooked. Educational facilities are a hub of activity from early morning and throughout the day so it's critical that the emergency lighting system is in place to ensure the safety of everyone. So it's important to remember that when undertaking a school refurbishment project that the emergency lighting must meet the standard BS 5266-1.



FLUORESCENT LAMPS PHASE-OUT

THE TIMELINE AT A GLANCE





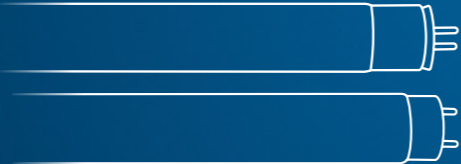


Lamp Type		EU Phase-out date (legislation)	GB Phase-out date (legislation)
CFLni Non-Integrated		24 February 2023 (RoHS)	1 February 2024 (RoHS)
CFLni Long life ($<30\text{W}$, $\geq 20,000\text{h}$)		24 August 2023 (RoHS)	1 February 2024 (RoHS)
T5		24 August 2023 (RoHS)	1 February 2024 (RoHS)
T8 (2', 4' & 5')		24 August 2023 (RoHS)	1 September 2023 (Eco-design)
T8 (other lengths)		24 August 2023 (RoHS)	1 February 2024 (RoHS)
T5/T8 Long life ($\geq 25,000\text{h}$)		24 February 2023 (RoHS)	1 February 2024 (RoHS)
SON Deluxe (most)		24 August 2023 (RoHS)	1 February 2024 (RoHS)

Chart adapted from The LIA's Guide to the latest announcement on RoHS (2023). The EU published its review of RoHS exemptions on mercury containing lamps on 24th February 2022. In the UK on the 30th January 2023 DEFRA published the Secretary of State's determination applicable to England, Scotland and Wales on the Government's website. The lamp type exemptions mirror the EU, but with extended implementation timescales as listed above.

FLUORESCENT TO LED

AS THE BAN ON FLUORESCENT LAMPS APPROACHES THERE IS AN OPPORTUNITY TO IMPLEMENT LED TO GAIN ENERGY SAVINGS, CARBON EMISSION REDUCTIONS WHILST MEETING THE LIGHTING REQUIREMENTS FOR A 21ST CENTURY SCHOOL OR ACADEMY.

FROM T8 TO LED - THE SCENARIO

Let's take a look at a classroom upgrade.

- Upgrade a classroom by replacing the current T8 fluorescent fittings (IQ Beam MPT)
- Classroom is 9m by 8m with a ceiling height of 2.75m
- In operation 5 days a week from 8.30am to 4pm
- In operation 2 nights a week from 6pm to 9pm
- Based on an energy cost of 0.39 (Eur/a)/kW based on a 10-year lifetime

Current costs and emissions:

12 (4x18W) T26 Recessed Modular Luminaire & 3 (1x36W) T26 Recessed Linear (500lux)

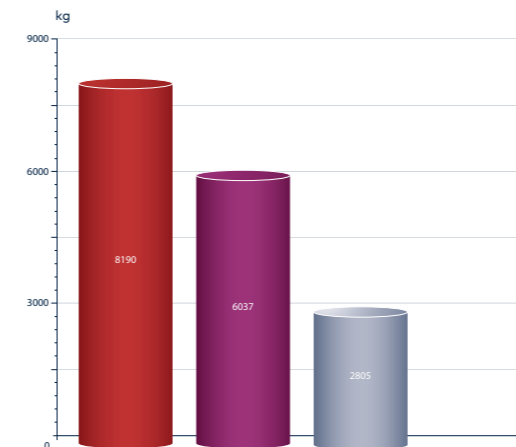
Total cost of solution over lifetime (absolute) EUR	22,507
Total investment costs EUR	1,403
Total running costs over lifetime EUR	22,700
Total energy costs over lifetime EUR	20,714
Total maintenance costs over lifetime EUR	2,056

MOVING FROM T8 TO T5 THROUGH TO LED

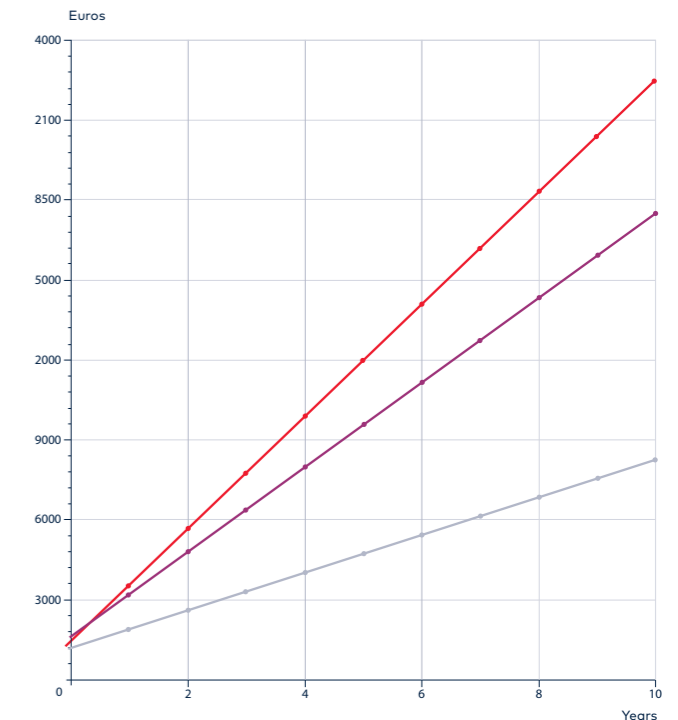
When stepping away from T8 technology to T5, instant reductions in energy usage and carbon emissions can be seen. A clear reduction of 66% has been achieved in this scenario just by switching to LED.

65%	66%	<3 MONTHS
Reduction in carbon emissions (Kg)	Reduction in energy costs (Eur)	Payback

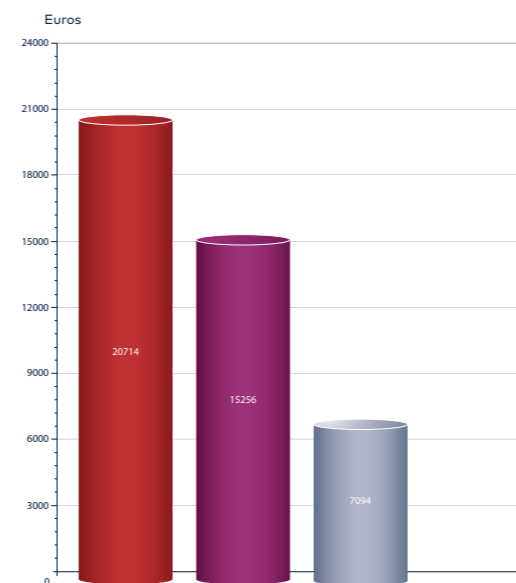
TOTAL CO₂ EMISSION IN USE-STAGE



PAYBACK PERIOD



TOTAL ENERGY COST OVER LIFETIME



KEY

- T8 Recessed Modular 4x18W
- T5 Recessed Modular 4x14W
- LED Recessed Modular IQ Beam 4500lm 840

CLASSROOM - REFURBISHMENT OVERALL RESULTS	T8 RECESSED MODULAR 4X18W	T5 RECESSED MODULAR 4X14W	LED RECESSED MODULAR - IQ BEAM - 4500LM
Total costs of solution over lifetime (absolute) [EUR]	22507	17428	8252
Total investment costs [EUR]	1403	1553	1123
Payback period of solution [a]	Base	0.29	Instantly
Total running costs over lifetime [EUR]	22770	17312	7931
Total energy costs over lifetime [EUR]	20714	15256	7094
Total maintenance costs over lifetime [EUR]	2056	2056	838
Average CO ₂ emission reduction per year (relative) [%]	Base	26.35	65.75
Average energy consumption per m ² and year (LENI) [kWh/(m ² a)]	58.63	43.19	20.08

NOW LETS ADD CONTROLS

SWITCHING TO LED HAS CLEAR BENEFITS FOR ENERGY EFFICIENCY AND SUSTAINABILITY. WHEN CONTROLS ARE INCLUDED THESE SAVINGS INCREASE EVEN FURTHER

WHY CONSIDER IMPLEMENTING CONTROLS?

Enhanced energy savings is just one of many benefits to installing affordable lighting controls. At Thorn we continually aim to deliver these benefits from the outside-in.

When it comes to outdoor lighting, integration of our PIR sensor (which can be easily retrofitted) mean that you can balance your energy saving targets whilst ensuring the safety of the buildings and those using it in the hours of darkness. By maintaining a lower level light output through the night you, exponentially lower energy consumption whilst still aiding CCTV and safety through enhanced light levels.

Looking indoors. Lighting control has clear energy saving benefits. As we see on the example, through the addition of controls energy savings can further increase from

~60 - 80%. The same can be said for savings in carbon emissions. Through control the space can be lit only when needed but with the flexibility of ensuring it provides the lighting needed for those using it.

Controls also provide opportunity to reduce flicker, which according to IES (Illumination Engineering Society), potential flicker-Induced Impairments can include reduced visual task performance, distraction through to headaches and fatigue.

Emergency lighting testing must be done monthly and certified annually. Through the implementation of our controls this can be done automatically and used to prove compliance to emergency lighting legislation (BS 5266-1).

85%

Reduction in carbon emissions (Kg)

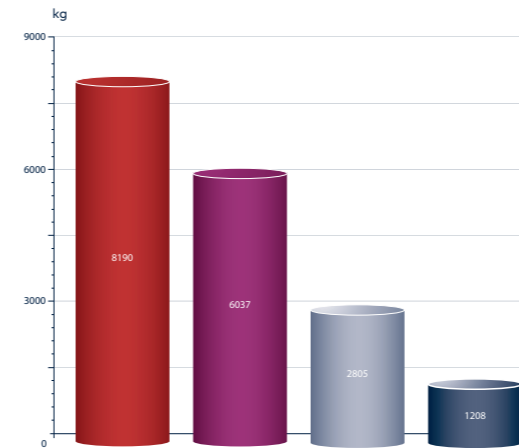
83%

Reduction in energy costs (Eur)

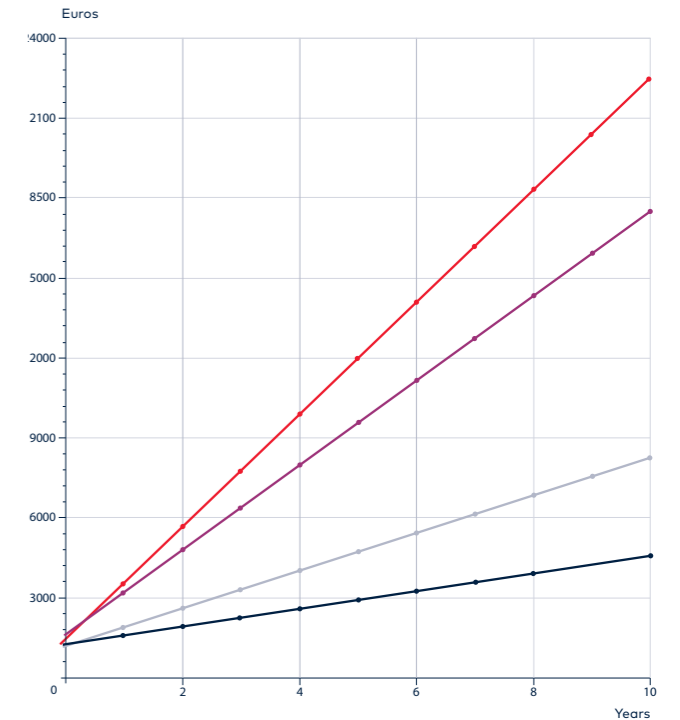
<3 MONTHS

Payback

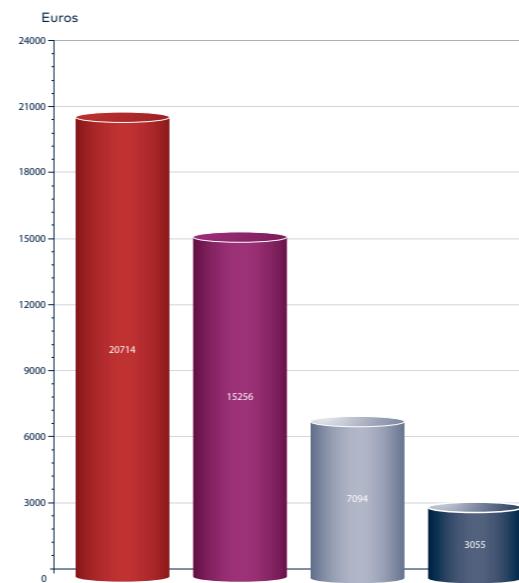
TOTAL CO₂ EMISSION IN USE-STAGE WITH CONTROLS



PAYBACK PERIOD WITH CONTROLS



TOTAL ENERGY COST OVER LIFETIME WITH CONTROLS



KEY

- T8 Recessed Modular 4x18W
- T5 Recessed Modular 4x14W
- LED Recessed Modular IQ Beam 4500lm 840
- LED Recessed Modular IQ Beam 4500lm 840 with controls

CLASSROOM - REFURBISHMENT OVERALL RESULTS WITH CONTROLS

	T8 RECESSED MODULAR 4X18W	T5 RECESSED MODULAR 4X14W	LED RECESSED MODULAR - IQ BEAM - 4500LM	LED RECESSED MODULAR - IQ BEAM - 4500LM 840 (WITH CONTROLS)
Total costs of solution over lifetime (absolute) [EUR]	22507	17428	8252	4509
Total investment costs [EUR]	1403	1553	1123	1258
Payback period of solution [a]	Base	0.29	Instantly	Instantly
Total running costs over lifetime [EUR]	22770	17312	7931	3893
Total energy costs over lifetime [EUR]	20714	15256	7094	3055
Total maintenance costs over lifetime [EUR]	2056	2 056	838	838
Average CO ₂ emission reduction per year (relative) [%]	Base	26.35	65.75	85.25
Average energy consumption per m ² and year (LENI) [kWh/(m ² a)]	58.63	43.19	20.08	8.65



CASE STUDY: GELLISWICK PRIMARY SCHOOL

WHEN PEMBROKESHIRE COUNTY COUNCIL IN WALES DECIDED TO BUILD A NEW PRIMARY SCHOOL IN THE TOWN OF MILFORD HAVEN, ITS AIM WAS TO CREATE A FLEXIBLE, MODERN LEARNING ENVIRONMENT.

The £12 million, 515-pupil Gelliswick Primary School replaces two older schools, and is one of several being built under the 21st Century Schools Programme, a £150 million initiative by Pembrokeshire County Council and the Welsh Government. In addition to the school, the site also includes an early years unit for 60 children under five, a complex needs unit for 24 pupils and other facilities for the local community.

A key requirement of the project was to create a better learning environment, improve wellbeing and attendance levels, and raise standards, as well as providing dedicated facilities for family integration.

THE SOLUTION

Thorn worked closely on the Gelliswick Primary School project with consultants Hoare Lea Cardiff, and M&E contractors Highadmit Projects, based in Beddau.

To create the desired environment, Thorn's next-generation IQ Wave luminaires were chosen for the classrooms and offices. Why? Well this smart recessed LED luminaire features intelligent controls, optics, design and installation, creating a smooth, homogenous illuminance with no visible LEDs. Low glare (UGR 19) ensures a comfortable ambient light, while high efficacy (>100lm/W) achieves significant energy savings in comparison to traditional light sources. So overall IQ Wave provides excellent lighting quality for learners and teachers alike whilst providing high user comfort and a communicative working environment.

Thorn's Chalice downlights, in the school's corridors, enables a 60% reduction in energy usage compared to conventional fluorescent downlights. Thanks to it's lifetime of up to 50,000 hours significantly reduces maintenance demands.

Thorn's IP65-rated Aquaforce LED luminaires provide the required lighting levels in the school's storage areas. The durable Aquaforce LED range from Thorn provides the highest level of light, efficiency and reliability in harsh wet and dusty environments, and is robust enough to withstand impact. Energy consumption and costs are reduced, and further savings come from longer maintenance lifecycles.

Emergency lighting throughout the facility is provided by Voyager C, a high-performance, surface-mounted, emergency lighting luminaire with an open area optic and three-hour manual test. Voyager C can be operated in either maintained or non-maintained modes.

THE RESULT

- ✔ ENERGY COSTS REDUCED
- ✔ MAINTENANCE COSTS REDUCED
- ✔ IMPROVED LEARNING ENVIRONMENT

The lighting solution provided by Thorn has helped the school to provide the best quality education to all children in the area and the best services to the local community. The school's new lighting provides even illumination with low glare, ideal for learning. A key requirement of the project was to create a better learning environment, improve wellbeing and attendance levels, and raise standards, as well as providing dedicated facilities for family integration. At the same time, energy and maintenance costs have been significantly reduced.

PRODUCT HIGHLIGHTS

✓ GLARE CONTROL
 ✓ ACOUSTIC COMFORT
 ✓ INTEGRATED CONTROL
 ✓ COMFORTABLE LIGHTING FOR LEARNERS



COLLEGE

For classrooms, College offers excellent glare control (UGR <19), with good cylindrical illuminance to aid communication.



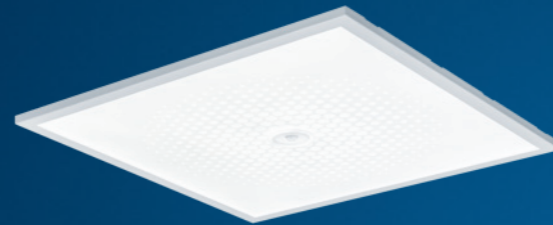
CHALICE

Our 1-1 Replacement for CFL or 1st Gen Downlights offering low energy consumption as well as dimming/emergency options.



ARENA SYMPHONY

The Innovative LED luminaire with sound absorbing features to minimise sound reverberation in classrooms.



OMEGA PRO

Incorporating Variable Colour Temperature (VCT) technology, Omega Pro allows for the right light temperature to be used for the tasks being undertaken within the space, for the users of the space.



CETUS

Our 1-1 Replacement for CFL or 1st Gen Downlights for ceiling cut-outs from 95 mm to 230 mm.



AQUAFORCE PRO

Our versatile waterproof and impact resistant luminaire featuring wireless connectivity! Aquaforce Pro offers unprecedented performance and versatility and is perfect for retrofit or refurbishment projects thanks to high efficacy which can result in significant savings.



IQ WAVE FAMILY

For surface or suspended the IQ Wave family offers excellent uniformity and glare control for comfort and productivity.



NOVALINE STYLE

Novaline Style looks great in areas that people move through, as well as stylish in social areas like breakout zones and delivers where efficient lighting is needed.



HIPAK

Offering high performance and excellent efficiency, HiPak easily replaces conventional high-bay luminaires, making it ideal for 1-1 replacement. High efficacy and durability results in exceptional savings both from an energy perspective and thanks to lower maintenance too.



DUOPROOF

An ideal choice for use in demanding environments where hygiene and reliability are crucial such as school kitchens. DUOPROOF is a durable luminaire featuring high level resistance to chemicals and heat, as well as IP65 protection against dust dirt, steam and water.

PRODUCT HIGHLIGHTS

✓ GLARE CONTROL ✓ ACOUSTIC COMFORT ✓ INTEGRATED CONTROL ✓ SUSTAINABLE SOLUTIONS



FLOW

Our highly versatile LED solution providing safety whilst creating a pleasant welcoming ambience.



CARAT

Elegant urban lantern with durable performance and best in class for efficacy.



AERIE

Putting light where and when it's needed! Our retro-fit and sustainable solution to provide visual comfort to outdoor spaces.



VOLUPTO

Elegance meets efficiency. Volupto is the perfect solution bringing both safety and energy efficiency together thanks to its integrated motion sensor and wireless connectivity options.



THOR

Ideal for car parks, Thor features integrated wireless connectivity and dimming in response to presence & daylight levels offering increased energy efficiency whilst maintaining safety for those in the space.



CANDLE BOLLARD

One of the few bollards on the market with low upward light output (ULOR), Candle has been designed for discreet lighting in areas such as paths and building surrounds and has an optional integrated motion sensor helping to save energy and reduce light pollution.



AREAFLOOD PRO

Our general purpose floodlight for both outdoor and indoor offering superior optical performance. Integrated control offers increased energy efficiency and can help to lower lifetime costs.



PIAZZA

Ideal for building perimeters and pathways Piazza offers excellent efficiency and minimal light pollution.

EMERGENCY LIGHTING

A SAFE WAY OUT

Our Voyager range of emergency solutions are designed, manufactured and tested to meet the latest European standards regarding safety and electromagnetic compatibility.

Our intelligent utilisation of LiFePO4 technology also significantly reduces parasitic load as LiFePO4 technology means fewer charge cycles once installed.

All emergency lighting should be specified and designed in accordance with local and/or national regulations

EN 60598-1
EN 60598-2-2
EN 62471
EN 55015

LED emergency luminaires
Photobiological standard
Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
Graphical symbols, Safety colours and safety signs. Registered safety signs.

ISO7010



VOYAGER FIT



VOYAGER BLADE



VOYAGER SIGMA



LIGHTING CONTROL SOLUTIONS

ENHANCING ENERGY SAVINGS AND REDUCING CO₂ EMISSIONS

WIRED LIGHTING CONTROLS

If you have a wired control solution in place already, then a simple upgrade can enable a world of features to enhance teaching. Control groups of lighting fixtures to reflect the learning activity, maximise energy savings through daylight mirrored dimming and connect to a simple switch for flexible and simple scene switching.

WHY GO WIRELESS?

Simply put, controlling your fixtures should not only be realistically accessible to those with an existing wireless infrastructure in place. Here at Thorn, our controls experts and BasicDIM solution can enable luminaire zoning, Variable Colour Temperature, daylight dimming and intelligent presence detection without the need for additional cable runs.



URBASENS DETECT! OUR RETRO-FIT MOTION DETECTION SYSTEM.

Enhanced energy savings is just one of many benefits to installing affordable lighting controls. At Thorn we continually aim to deliver the best of both worlds, for example our high performance PIR motion detection control UrbaSens Detect can be retro-fitted to any 60mm pole up to 4m high. When motion is detected the luminaire switches to 100% light output ensuring safety of those in the space but dims to 20% when no motion is detected exponentially lowering energy consumption.



CASE STUDY: BROUGHTON PRIMARY SCHOOL

PROVIDING COMPREHENSIVE AND ENERGY SAVING SOLUTIONS FROM THE OUTSIDE IN.

Broughton Primary School in Edinburgh dates from the Edwardian period, but has been extensively rebuilt and refurbished over the years. Thorn's brief for lighting the school was to contribute to a finished effect that provided the perfect environment for pupils and staff.

THE LIGHTING SOLUTION - INDOOR

Thorn Lighting provided a low-maintenance, energy-efficient solution for the whole school. Five different types of luminaire were used, including the innovative IQ Wave with built-in wireless technology.

Thorn's IQ Wave Suspended was chosen for the classrooms. This elegant and innovative fitting achieves the ideal light distribution - with high cylindrical illuminance to light faces - with the help of a special reflector.

The luminaires also feature Thorn's BasicDim Wireless functionality, allowing them to communicate wirelessly with sensors for presence detection and daylight-linked dimming. The wireless-ready luminaires are installed like any other, with no need for additional hardware or rewiring.

The extremely robust HiPak Pro LED has been used to light the school's gym hall. HiPak Pro uses dedicated optics for precise light control, **while also providing energy savings of up to 45%** compared to traditional HID fittings.

THE LIGHTING SOLUTION - OUTDOOR

The precision-designed Piazza LED bulkhead has been installed around the school perimeter to provide light for security and wayfinding. Piazza LED offers optimal light distribution with a minimal upward light ratio of less than 2.5%.

THE RESULT

The new lighting creates a perfect learning environment for pupils and teachers alike. And the ability to dim lights when there is sufficient daylight means **savings of up to 75% can be made on energy.**

In particular, the IQ Wave fittings support comfort and alertness in the school's classrooms, ensuring the perfect lighting for desk-based tasks, group presentations or discussions, and a pleasant overall atmosphere.



TIME TO REPLACE YOUR FLUORESCENT LAMPS?

It's time to get wise and switch to LED!
LED Lighting can reduce energy consumption,
reduce CO₂ emissions and save on your
overall costs!



See how much you
could save with our
savings calculator



WATTWISER

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WE
MAKE
LIGHT
WORK