

You define. We connect.

Introduction to Glamox Light Management Systems



# You define. We connect

A Light Management System (LMS) from Glamox is a complete lighting solution. You define what you need, and we connect lighting solutions based on your specific requirements.

By combining premium luminaires with carefully chosen smart technology, we can offer lighting solutions that provide great benefits and are tailored to suit different tasks and purposes. Particularly beneficial is the ability to reduce energy and maintenance costs, as well as the carbon footprint, in addition to extending the installation's lifetime.

Our light management systems can adapt seamlessly to the end users' needs, and contribute to a productive and healthy working environment. Based on the latest technology, our systems are easy to plan, install, commission and use.

In addition to providing lighting solutions that are tailored for different tasks, we offer a user-friendly dashboard solution, named Glamox Connect. This software provides the information necessary to easily monitor energy consumption and emergency light installations.



Do you know what goals you want to achieve?

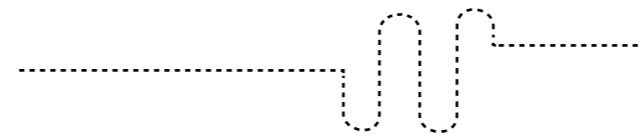
If you have already set your targets, but need some professional advice on how to achieve them – we have several decades of experience and a wealth of knowledge to share with you.

Feel free to contact your local sales representatives or visit our website [www.glamox.com](http://www.glamox.com).



# Light management systems for all needs

Whatever the requirement, Glamox can provide light management systems that meet them in full. In addition to significant energy savings, our solutions can fulfil many important targets.

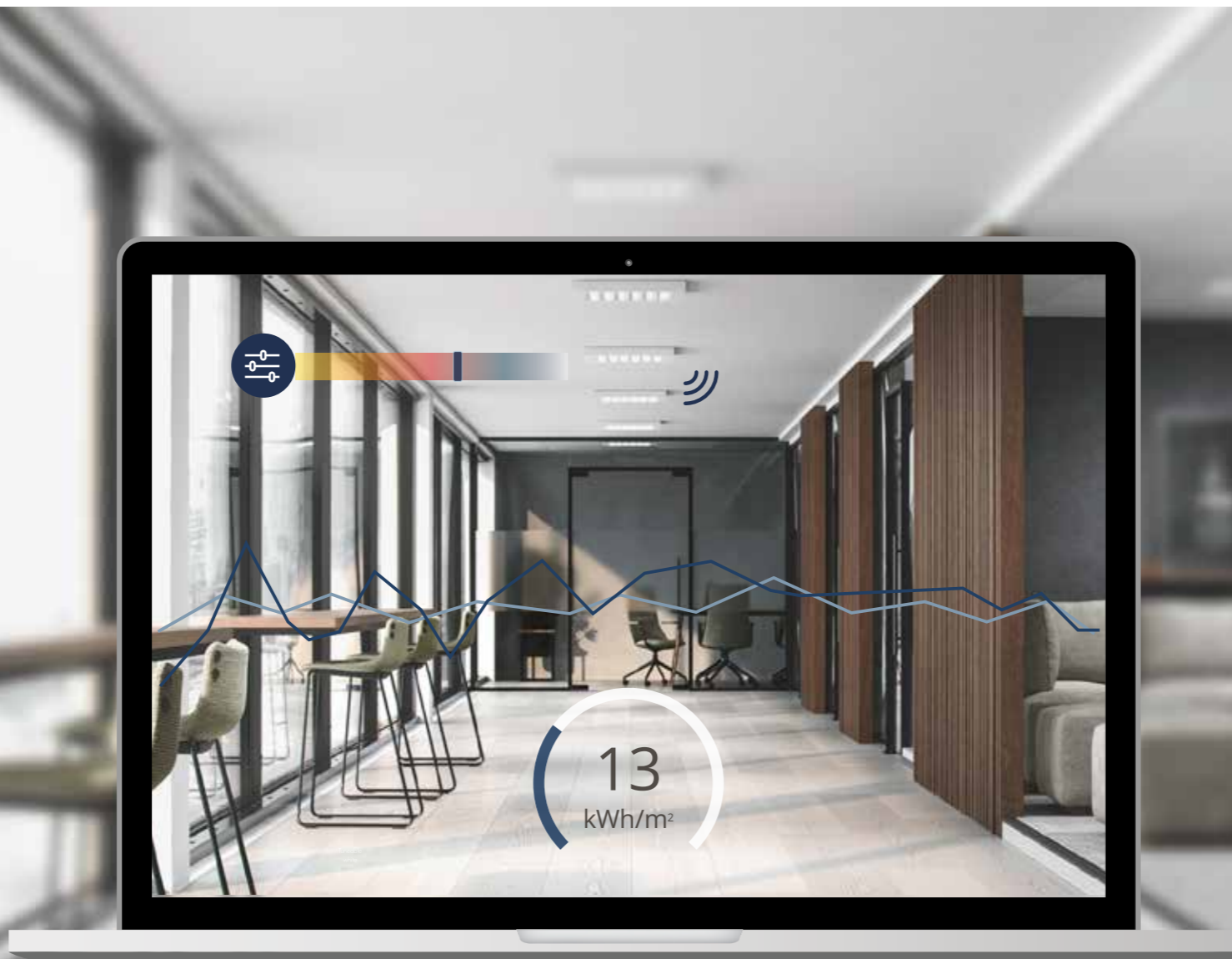


## Lower life cycle costs

Reducing energy consumption, maintenance costs and extending the lifetime of the installation.

## A more productive working environment

A lighting solution that provide optimised work- and living environments. Furthermore, a HCL solution can enhance performance, well-being and support a favourable circadian rhythm.



## Easy monitoring

Our monitoring solutions are based on open standards, tested and adapted to non-technical users.

## Easy emergency lighting monitoring

By using addressable emergency lights, it is easy to set up test cycles and generate reports that fulfil European and national standards.

## Easy maintenance planning

The Glamox Connect solution is a great tool that provides all the information for handling maintenance in a quick, easy and cost-efficient way.

## Easy energy consumption mapping

Our simple user interface provides monitoring of the energy consumption in different areas of the building.

## Easy access to data

Thanks to a well-thought-out system architecture and open-standard protocols, the data can easily be transmitted to a building management system (BMS) regardless of the type of communication.

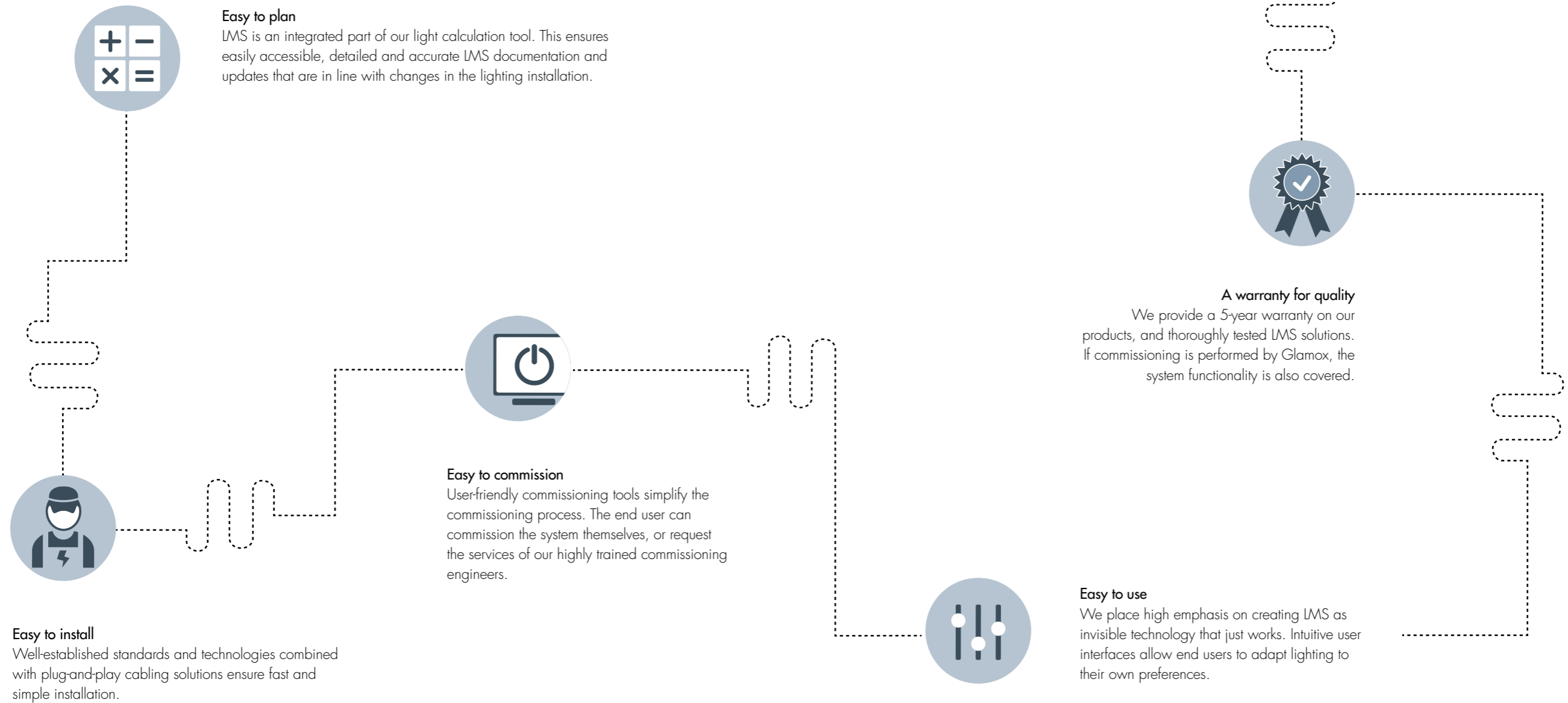
## Easy area planning

By heat mapping an area based on presence, you can visualise the use of the space and adjust the lighting to actual needs. In addition, you can get reports on how the space is used, and optimise the use of the building.

# Just the right choice

How Glamox solutions make things easier

We can supply a variety of light management systems offering different levels of complexity, all with full support at every step of the process. Our systems are:



# The great effect of light

Human Centric Lighting (HCL) is a way of bringing the natural changes of light intensity and colour temperature indoors by using artificial light in order to imitate natural light.

Humans are affected by light not only on a visually level, but also on a biologically one. The right light at the right time can influence everything from our sleep to how we feel and perform. That is why HCL is beneficial for schools, health facilities and industrial buildings.



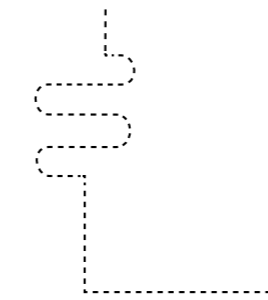
## How to implement Human Centric Lighting?

In combination with an HCL luminaire, a Human Centric Lighting solution requires a sophisticated light management system to set and adjust the time cycle for the intensity and colour temperature of the light. When installing HCL, there are four parameters that require close attention:



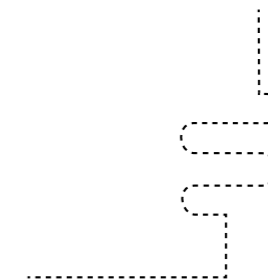
### Spectrum

We use cool white light sources with wavelengths in the blue spectrum to stimulate the body in the morning and as a boost when high concentration and alertness is needed. Warm white light can aid relaxation and rest in the evening.



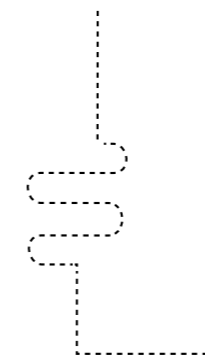
### Intensity

Research has taught us how much light is needed to influence the biological processes in the human body. We need to choose solutions that provide enough light to achieve this, while taking care of issues such as unwanted glare and energy consumption.



### Timing and duration

Light in the morning boosts our activity and can improve sleep in the evening. Advanced light management systems allow us to create a schedule that takes these factors into account.



### Distribution















For light to have a biological effect, our eyes need to be able to perceive bright areas in the room as effectively as possible. With the right angle and lighting design we can calculate how to get the most optimal effect.

You define. We connect.

Innovative light management tailored to your needs. Using cutting-edge technology, we create the features that you select, and we deliver them in order to meet all necessary requirements in project specifications.



Other features

-   
Switch
-   
Tunable white
-   
Dimming
-   
RGBW
-   
Neighbouring linking
-   
Multi-group
-   
Dynamic grouping
-   
Scheduler
-   
Push notifications
-   
Central monitoring
-   
Maintenance monitoring
-   
Customised user interface
-   
Online platform
-   
Open API

# You define. We connect.

We offer light management solutions on three different levels of complexity. You define what type of features you need and which areas you want to cover, whether it is an entire building or a single room. Afterwards, we connect premium luminaires with smart technology in order to create precisely the solution you need, delivered according to user needs and the project specification.

## Single-room

- one room at a time

Simple solutions for single room applications. From mains-switching sensors to easy-to-use light scene control, our single room energy saving options offer both basic and complex levels of control.



## Multi-room

- interactions between rooms

Multi-room controls take functionality beyond a single space, allowing advanced features such as corridor linking, time management and daylight harvesting. Our modular approach allows the systems to grow and expand as the building and client requirements evolve.



## Building Wide

- interactions in the whole building

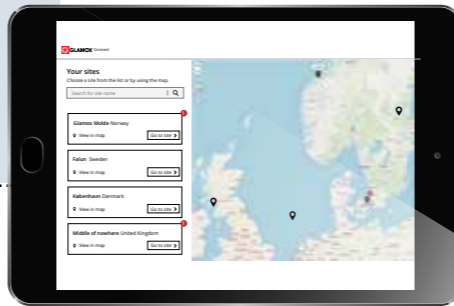
A building wide system is at the heart of every smart building. Our centrally monitored lighting management systems provide full visual feedback and a detailed building analysis. All our solutions are capable of sharing data through open API's (application programming interfaces) to allow further integration with other building services – such as BMS or room booking systems.



# Glamox Connect

All you need in one system

Glamox Connect is our central monitoring system. It works like a hub for integrating different LMS technologies, and offers complete control over your light installation, with 24-hour monitoring of all your devices.



**Safe storage in the cloud**  
Access your sites and data from anywhere.

## Multi-user and multi-site user interfaces

Glamox Connect is a cloud-based web application for designated users. Let them share the data on all your sites for complete control over the entire lighting installation.



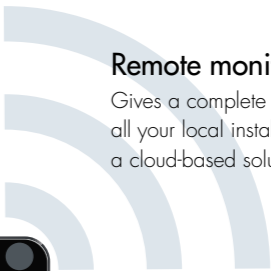
## Energy monitoring

A complete overview of the energy consumption on your site, which can be filtered by predefined areas.



## Emergency monitoring

Get alerts directly to maintenance personnel when emergency lights are failing, and generate emergency reports according to standards.



## Remote monitoring

Gives a complete overview of all your local installations from a cloud-based solution.



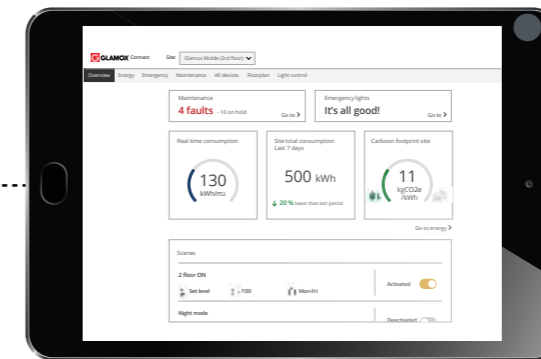
## Floor plan

An easy overview of your installation thanks to a clear and easy-to-prepare floor plan visualisation.



## Maintenance planning

Receive alerts whenever luminaire faults occur, including information about each fault and its location. The system has direct integration with online product pages.



## SMART integrations

Continue utilising the data that is available in the cloud.

# Smart lighting for every space

We have a long history of providing lighting solutions for all applications and market sectors. In addition to our comprehensive product portfolio, we also offer valuable knowledge and guidance. For us, each project is a unique challenge, and we aim to provide solutions tailored to individual needs.



Industry

Outdated installations and high cable replacement costs are common challenges in industrial facilities. Wireless communication for the lighting controls thus becomes the solution that brings the most advantages.



K3 Logistics West | Helsinki, Finland

### Keys to success

- Solutions suitable even for extreme conditions
- High component IP rating
- Precise sensors for use in areas with high ceilings
- Components with high durability



Education

Multi-building management, maintenance, joint administration - schools have many requirements. This is precisely when the benefits of central control and monitoring are especially useful.



Greswaren | Central Limburg, the Netherlands

### Keys to success

- Easy, cost-efficient maintenance
- Easily adjustable lighting in classrooms
- Creating a good learning environment for students with Human Centric Lighting



Office

Hot desks, quiet rooms, breakout areas – modern office buildings are undergoing dynamic changes. The lighting installation has to keep pace with new challenges and flexibly adapt to them.



Mennica Legacy Tower | Warsaw, Poland

### Keys to success

- Easy to remove/add control devices
- Flexible solutions adaptable to different functions and floor plans
- Intuitive user interface for end users



Healthcare

There is nothing more important in medical facilities than the safety and well-being of patients and staff. Therefore, proven solutions that meet the highest standards and take into account the impact of light on human health are essential.



Sørlandet Hospital | Kristiansand, Norway

### Keys to success

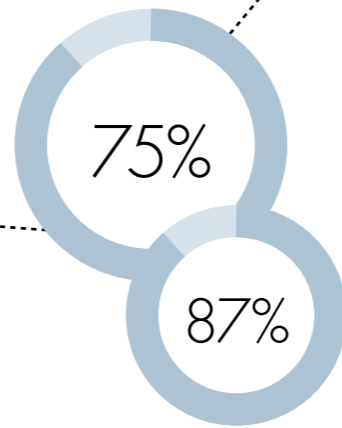
- Contactless usage in cleanrooms
- Intelligent solutions for the patients' recovery, well-being (HCL) and wayfinding
- Increasing contrast conditions in operation rooms by using coloured light
- High efficiency and longer lifetimes of luminaires thanks to the longevity of the light installation's operation

# Reduce carbon footprint - save energy costs

Renovate smarter with a light management system

Electricity bills are among the largest costs at any facility - and lighting is a major part of it. But the great news is that with our light management systems, you can reduce energy consumption by up to 90%.

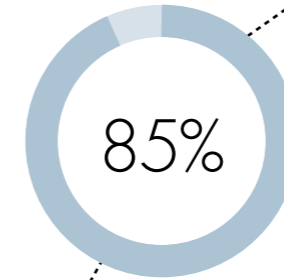
Lower energy consumption translates to less waste and less pollution. You can choose solutions that are both economical and eco-friendly. With LMS, it is as simple as that.



## Spenncon's production hall

New LED luminaires, sensors and wireless control reduce the power consumption of the Norwegian company Spenncon with more than 1 GWh per year and annual savings of nearly 100,000 €.

**Previous energy consumption:**  
1.4 GWh per year  
**With Glamox LMS:**  
350 MWh  
**Estimated energy savings:**  
up to 87%  
**Adjusted to customer preferences:**  
75%



## Finlebanen car park

Trondheim Parking, the public parking company, upgraded two of their parks with new LED luminaires and a wireless light management system from Glamox. It allows full control over the lighting installation from the company's offices through our cloud-based solution.

**Previous energy consumption:**  
14,400 kWh per week  
**With Glamox LMS:**  
2,160 kWh  
**Estimated energy savings:**  
85%



## Office space of the future

Økern Portal - Oslo, Norway.

Økern Portal is a huge new building complex with a central location in Oslo. It has an ambitious environmental profile, including re-establishing biodiversity through green roofs and local cultivation.

Energy consumption, waste, pollution and material sourcing are carefully adjusted to ensure a sustainable build and extended life cycle. The project is aimed for a BREEAM-excellent rating.

The biggest challenge in this project is the sheer size of the building. The size of the project in combination with short construction times require careful planning and administration.

### A place for innovation

Økern Portal is one of the largest office buildings in Scandinavia – the total size of the project is 88,000 m<sup>2</sup>. Of this, 55,000 m<sup>2</sup> is office space. The design is inspired by the forest, with ample greenery inside and a unique rooftop terrace. When completed, the building will house 3,000 employees working for a wide variety of tenants.

Glamox Connect provides a full overview of the project

Økern Portal is full of new inventions. The building owner has seen the benefits of upgrading from standard to innovative solutions for the future, including ultra-modern lighting solutions. This is a key factor when promoting the building to potential tenants.

### Smart solutions for smart building

There are 7,500 Glamox luminaires installed in the building. All of these have integrated Glamox wireless ZigBee technology. The luminaires are monitored with the cloud-based Glamox Connect dashboard. This is an open system that can be used with different light management technologies. Glamox Connect also offers open cloud-to-cloud API for communication with BMS systems.

Glamox Connect provides a full overview of the project, including how the space is used, detailed information about each luminaire, as well as the status of emergency lights. Glamox Connect can be monitored remotely by anyone who has access to the system. This simplifies the maintenance work. All relevant reports can be generated by Glamox Connect.

# A zero-energy school for a better future

Roligheden School - Arendal, Norway

When Roligheden School in Arendal opened its doors, it was, in all respects, a progressive and environmentally-friendly building that greeted pupils and teachers.

The school was planned as a zero-energy building, which means the total amount of energy used by the building on an annual basis is equal to the amount of renewable energy created on site. Alongside with energy wells and solar panels, energy-efficient lighting also helps minimise the climate footprint.

## The key to energy efficiency

To succeed with a zero-energy build, good planning and collaboration along the way are required, and the Central Operating System plays an important role in that. Here, all the information from the lighting control system and other technical installations (heating, ventilation, solar cells etc.) are gathered so that operational staff are able to gain an overview and operate the building efficiently.



A school building is so much more than just walls.

The lighting system has a great impact on reducing energy consumption. That's why the contractor has chosen to use energy-efficient LED products from Glamox throughout the building. Glamox has also been involved in designing the lighting control system, a Glamox KNX system which e.g. prevents the light from being switched on in rooms that are not in use. All stairs and corridors are equipped with motion sensors. In the classrooms, switched on manually and switches off 15 minutes after activity has been registered.

## Healthy lighting and spaces for learning

A school building is so much more than just walls. It is a place you should enjoy and feel safe in, with room to play and participate in various activities, and not least of all - for learning. A holistic way of thinking around learning characterises the design of the Roligheden school. It also includes lighting that will help pupils become more alert and focused.

The school has Human Centric Lighting in every classroom and workspace. That means that the intensity and colour temperature of the light varies throughout the day to mimic daylight. In the mornings, pupils are given a boost with intense cool white light to help them wake up and focus. After 2 hours, the colour temperature changes and the light dims to standard interior lighting. Teachers are also able to set the lighting on focus light during tests and other activities requiring concentration. In addition, there is a setting that provides a warm and subdued light to be used when students are to have a quiet and calm period.



## A new level of energy efficiency

ABP Ports, Kingston upon Hull, England

Contributing to the 6 million tonnes of cargo handled by Humber ports every year, Associated British Ports' (ABP) Port of Hull Terminal needed a lighting system that could meet the energy demands of a 24-hour port with very little downtime.



### Well-matched LED solutions

The customer's brief was the design, supply and installation of an LED lighting and wireless lighting management system for 3 warehouses located on the Finland Terminal, Queen Elizabeth Dock. The existing 250 W and 400 W high-pressure sodium luminaires were to be replaced in the same location with suitably rated, individually fused LED luminaires generally in accordance with TM21, to meet the desired specification.

The installation should utilise all existing cabling where possible. Dedicated HI-MAX warehouse luminaires with an extremely high efficiency were supplied with appropriate glare and luminance ratings. The scheme was verified via a DIALux calculation prior to installation.

The warehouses' 24/7 working cycles and lighting usage information were collated and our energy calculation tool was then used to estimate energy savings. Results showed that the new lighting system would provide high energy cost savings and payback would be achieved in as little as approximately 2 years.

ABP achieved 96% energy cost savings, exceeding our realistic calculations

### Wireless flexibility

The wireless system was designed to be programmable with an Android tablet. The system makes it possible to collate occupancy data in order to monitor the energy usage and operating status of the emergency lighting. The luminaires were provided with presence and light sensors, so that the system could be programmed to fully utilise natural daylight and illuminate areas as specifically required.

The whole system supplied is wireless, so reconfigurations are possible in the future without the need for rewiring or gaining access to the luminaires or sensors. Representatives from the Estates Department were provided with training by our commissioning engineers, which would then allow them to fine-tune the system as required in the future. ABP achieved 96% energy cost savings, exceeding our realistic calculations.

You define.  
We connect.

	Single-room			Multi-room	Building-wide		
	PÅ/AV sensor	Dimmer	Systemsensor	DALI Complete	Wireless Zigbee	Wireless Radio	Ethernet2Dali
Switch (ON/OFF)	●	●	●	●	●	●	●
Motion sensor	●		●	●	●	●	●
Absence detection	●		●	●	●	●	●
Dimming		●	●	●	●	●	●
Multi-group			●	●	●	●	●
Dynamic grouping						●	
Daylight harvesting			●	●	●	●	●
Neighbouring linking			●		●	●	●
Tunable white		●		●	●	●	●
RGBW				●	●	●	●
Energy monitoring				○		●	○
Human Centric Lighting				●	●	●	●
Scheduler				●	○	●	●
Customised user interface				●	○	●	●
Push notification				○	○	●	○
Central monitoring				○	○	●	○
Emergency monitoring				○	○	●	◐
Maintenance monitoring				○	○		○
BMS integration				○	○	●	●
Space usage analytics				○	○	●	○
Online platform				○	○	●	○
Open API				○	○		○

● Integrated in the system

○ Glamox Connect

Have even more control with Glamox Connect - our user-friendly dashboard solution. Choose our cloud-based web application to gain all the information for handling maintenance in a quick, easy and cost-efficient way.

All our systems can be further scaled up to a central monitoring solution, either directly or by using a gateway / access point.

#### DALI Complete

Based on the Cockpit software as a commissioning tool, this is our standard DALI solution. The perfect problem solver for complex stand-alone solutions.

#### Wireless Zigbee

Our wireless solution that communicates on a standard Zigbee protocol. Mixing Zigbee and Bluetooth communication creates a perfect stand-alone solution that can be scaled for larger projects.

#### Wireless Radio

A wireless solution based on a 868 MHz protocol - perfect when you require easy commissioning in a challenging environment.

#### Ethernet2Dali

Our most advanced cabled solution based on our own DALI2 Application controller, Vertex. It's perfect if you need a scalable solution with an advanced logical module.

## A glossary to help you understand the LMS world

<b>Light Management System (LMS)</b>	A smart lighting control system which can be easily programmed through an intuitive user interface, remotely controlled or monitored, wired or wireless.
<b>SMART technology</b>	Short for Self-Monitoring, Analysis and Reporting Technology.
<b>Glamox Connect</b>	Software that provides the intelligence and insights necessary to easily monitor energy consumption and emergency lighting installations. Is a great tool providing all the information for handling maintenance in a quick, easy and costefficient way.
<b>HCL – Human Centric Lighting</b>	A way of bringing the natural changes of light intensity and colour temperature indoors by using artificial light in order to imitate natural light.
<b>Addressable emergency lights</b>	Emergency luminaries based on the DALI standard which can be controlled and managed with a central monitoring system. These types of emergency luminaries can be mixed with general lighting scenes.
<b>Building Management System (BMS)</b>	Otherwise known as a building automation system (BAS) – a computer-based control system that controls and monitors the building’s equipment such as ventilation, lighting, power systems, fire systems, and security systems.
<b>Heatmap</b>	A data visualisation technique that shows the magnitude of a phenomenon (e.g. presence detection) in colour in two dimensions.
<b>Smart buildings</b>	Modern and energy-efficient buildings.
<b>API</b>	An application programming interface.
<b>Central Monitoring System</b>	A central monitoring system monitors a technical installation and gathers all collected information in a single location. This makes monitoring a lighting controls system fast and easy, no matter how complicated the location is. Central monitoring systems can be customised to fit the application perfectly.
<b>System architecture</b>	A conceptual model that defines the structure, behaviour, and several views of a system. An architecture description is a formal description and representation of a system, and is organised in a way that supports reasoning about the structures and behaviours of the system.
<b>Mesh technology</b>	A network topology where each node receives and passes on data to the network. This way all nodes cooperate in the distribution of data in the network.

<b>Pulse Width Modulation (PWM)</b>	This refers to the concept of changing the pulse width of a digital signal on a wire. When dimming an LED light source, PWM is used to simulate a varying static voltage.
<b>Tunable White technology</b>	A technology that allows users to adjust the colour temperature of a luminaire. The technology is based on two white light sources with different colour temperatures and a mixing chamber (e.g. the luminaire). Users can modify the luminaire’s correlated colour temperature (CCT) and light intensity via an input from a lighting controls system.
<b>RGB</b>	This refers to the primary colours – red, green and blue. In order to create light with different colours you need to combine individual LEDs with radiation in the red, green and blue spectrum. This is referred to as RGB in DALI DT8.
<b>PIR sensor</b>	A passive infrared sensor; an electronic sensor that measures infrared light (heat) radiating from objects in its field of view. A special lens is placed in front of the IR sensor. When the system measures IR radiation moving from one lens segment to another it is interpreted as presence. PIR sensors are most often used in PIR-based motion detectors.
<b>DALI</b>	Digital Addressable Lighting Interface; a standardised (IEC 62386) protocol describing digital communication between lighting devices, which makes it possible to address them individually; a protocol is set out in the technical standard IEC 62386.
<b>Dynamic Grouping</b>	Luminaires are commissioned to work in more than one group or overlapping groups. For example, a row of luminaires can be programmed to illuminate a corridor area between desks, but also operate as part of a 3x3 grid for a user sat at one of the desks. This level of granular control is not possible with DALI.
<b>DALI device type 8 (DT8)</b>	Part of DALI protocol that is used to modify colours and colour temperatures. DT8 is used to create Human Centric Lighting solutions.
<b>KNX</b>	A standardised (EN 50090, ISO/IEC 14543), Open system interconnection model (OSI) based network communications protocol for building automation.
<b>BACnet</b>	An open communications protocol for Building Automation and Control (BAC) networks that can implement the ASHRAE, ANSI, and the ISO 16484-5 standard protocol.
<b>Internet of Things</b>	The Internet of Things (IoT) connects machines and devices to one another.
<b>PoE</b>	Power over Ethernet (POE) is a technology that lets network cables carry electrical power.





## The Glamox Group

Glamox is a Norwegian industrial group that develops, manufactures and distributes professional lighting solutions for the global market.

### Quality brands and solutions

The Group owns a range of quality lighting brands including Glamox, Aqua Signal, Luxo, Norselight, LINKSrechts, Küttel, Luxonic, LiteLP, Luminell and ES-SYSTEM. Glamox is committed to meeting customer needs and expectations by providing quality products and solutions, service and support.

### Technology and expertise

Our products and solutions are developed and tested by our engineers at our own research and testing facilities, and manufactured and certified in accordance with all relevant quality and environmental standards. They are based on the latest technology and expertise – and generations of experience.

