LIGHT FOR HEALTH AND CARE

Light for Health and Care

Hardly any other application area demands such complex lighting solutions as health and care facilities, where an extremely wide range of requirements have to be met in order to create perfect conditions: doctors and care staff need different lighting situations in order to perform tasks that require high levels of concentration. Efforts are also made to achieve a feel-good atmosphere for patients. Lighting therefore has to cater for the needs and preferences of various groups of individuals in different situations. Zumtobel's intelligent lighting solutions reconcile these disparate requirements and interests.
Thanks to extensive research, we know how light can affect mood and well-being. Our product development and consultancy work take into account the results of international research studies. The primary purpose of lighting in hospitals is to improve the quality of the patient's stay, thereby also aiding recovery. The emphasis in care facilities is on using light in the right way to improve quality of life, for example to compensate for inadequate daylight by providing dynamic lighting solutions that mimic changes in daylight over the course of a day. Innovative technologies and intelligent controls also minimise energy consumption. This is how Zumtobel strikes a balance between lighting quality and energy efficiency.

Zumtobel. The light.

Applications


St. Franziskus Care Home, Marsberg | DE


Maldegem Care Home | BE


Rüsselsheim Clinic | DE

Hamburg-Eppendorf University Clinic, Hamburg | DE

Gmunden Regional Hospital | AT


Elisabeth Residential Care Facility, Breda | NL


Dr. Martin Ladentrog Dental Practice, Graz | AT


Offenbach Clinical Centre | DE

References

Bad Soden Cardiac Centre, DE | Bregenz Regional Hospital, AT | Brothers of Mercy Hospital, Salzburg, AT | Cantonal Hospital Basel, CH | Caritas Socialis Vienna, AT | Centre Hospitalier, Mouscron, BE | Children and Pediatric Hospital, Dammam, SA | Chur Hospital, CH | CHUV Maternity, Lausanne, CH | Constance Clinics, DE | Dornbirn Hospital, AT | Elisabeth Residential Care Facility, Breda, BE | Erasmus MC, Rotterdam, NL | Franz-Tappeiner Hospital, Merano, IT | Fujairah Private Hospital, AE | General Hospital, Biljurashi, SA | General Hospital, Sakaka, SA | Geneva University Hospital, CH | Gmunden Regional Hospital, AT | Göttingen University Clinic, DE | Graz Regional Hospital, AT | Gynaecological Clinic, Lucerne, CH | Hamburg-Eppendorf University Clinic (UKE), DE | Innsbruck Regional Hospital, AT | Klagenfurt Regional Hospital, AT | Liesing Geriatric Centre, AT | Lippe Detmold Clinical Centre, DE | Maldegem Care Home, BE | Marien-Hospital, Witten, DE | Marienkrankenhaus, Hamburg, DE | MCRZ Rotterdam, NL | Medicity Gurgaon, IT | Minden Clinical Centre, DE | Oberaich Centre for Care of the Elderly, AT | Offenbach Clinical Centre, DE | Ospedale Trento, IT | Ospedale Verona, IT | Paracelsus Clinic, Osnabrück, DE | RSA G. Frisia, Merate, IT | RSA Mazzali, Mantova, IT | RSA Morelli Bugna, Verona, IT | RSA Selvazzano, Padova, IT | Salzburg Regional Hospital, AT | St. Georg Municipal Clinical Centre, Leipzig, DE | St. Katharina Vienna, AT | St. Pölten Regional Hospital, AT | Szpital Wojewodzki, Slupsk, PO | Triemli Municipal Hospital, Zurich, CH | Twente Universiteit, NL | UZ Ghent, BE | Vienna General Hospital, AT | Wroclaw Hospital, PL | Zollikerberg Hospital, CH

Photo on front cover: Municipal Hospital, Dornbirn | AT
Architects: Architekturbüro Gohm und Hiessberger, Feldkirch | AT
Lighting solution: SLOTLIGHT, SUPERSYSTEM, PURELINE, LIGHT FIELDS

Attractiveness and well-being

Against a backdrop of demographic change and an ageing population, a highly-qualified, motivated workforce is absolutely vital. Patients choose the hospital that will give them the best care. We supply the best lighting designed to enhance well-being among staff and patients by using premium lighting solutions to create a pleasant, refreshing room atmosphere.

Reasons for choosing LED:
– Variable light colours
– Can be controlled appropriately to needs
– Versatility and high lighting quality
(good colour rendering, high-precision direction of light)

Resulting in:
– Attractive scenarios for any time of day or activity
– Individuality

Space and capacity

Healthcare and nursing providers are constantly confronted by the problem of limited available space. Sufficient infrastructure and spare space must be kept available to cope with emergencies such as epidemics but, on the other hand, recurring costs must be kept as low as possible.

Reasons for choosing LED:
– Small size
– Can be integrated into architecture/furniture
– Individually controllable/addressable

Resulting in:
– Spatial flexibility
– Expandability

Cost savings

Costs play a key role in the healthcare and nursing sector in the EU and in most international markets. These costs include, among others, the costs of qualified staff, property maintenance, operating costs and the expenses incurred during a stay in hospital. Premium lighting solutions can aid convalescence, thus shortening hospital stays, which in turn results in cost savings.

Reasons for choosing LED:
– Highly efficient
– Maintenance-free
– Easy to control

Resulting in:
– Energy savings and reduced CO_2 emissions
– Low operating and maintenance costs
– Lower total costs over a system's entire life cycle

Attractiveness and well-being
Quality for patients and persons who require care

"It's especially important that dementia sufferers feel safe and secure. Everything must be done to make sure they do. Sufficient light of the right quality helps give dementia sufferers sense of safety and security. Circadian light helps establish a good day-night rhythm and reinforces the "interplay" between day and night. It can also improve sleep quality and daytime wakefulness. This can make nursing and care a more positive experience for both patients and staff."

Michael Schmieder
Director | Sonnweid Care Home, Wetzikon | CH

Kittsee Care Home | AT
Architecture: Arch. Prof. Ing. Mag. Heinrich Wolfgang Gimbel, Oberwart | AT
Lighting solution: LIGHT FIELDS surface-mounted luminaires, PURELINE bedside luminaires, SCONFINE SFERA pendant luminaires, SLOTLIGHT light lines, ONLITE COMSIGN LED escape sign luminaires, ONLITE RESCLITE emergency luminaires, LUXMATE BASIC lighting control system

Demographic changes in most European countries mean that the numbers of elderly people who will need care is set to rise sharply over the next few decades. The elderly have different needs. Lighting design must take this fact on board and take it seriously in order to enable the elderly to lead autonomous lifestyles. Eyesight deteriorates drastically with age, 3D perception grows worse and sensitivity to glare increases. Insufficient daylight disrupts sleep-wake rhythms. Freedom of movement also becomes restricted with age. Lighting can be used to respond to these altered requirements, thereby redefining residents' and patients' quality of life. Higher lighting levels make it easier for patients to see, even when performing simple visual tasks, and uniform illuminance levels ensure greater safety, especially in corridors.

1 Attractiveness and well-being
Structuring time

- **The right lighting helps synchronise biological rhythms and works in harmony with them**
- **Colour temperature and lighting intensity can mimic those of natural daylight over the course of a day**
- **Nature is the perfect model for pleasant, refreshing lighting**

Besides its functional and emotional components, lighting also has a non-visual, biological effect on humans. Light also provides an important time base for circadian sleep-wake rhythms. However, due to restricted mobility or unfavourable building layouts, there is often no easy access to daylight in hospitals and care facilities. Biological rhythms are quickly thrown out of balance, which has an impact on well-being and productivity. The elderly, in particular, have an innate need for larger amounts of light and, when there is not enough daylight, they experience night-time insomnia. This can cause unease and anxiety which make them less active and adversely affect well-being.

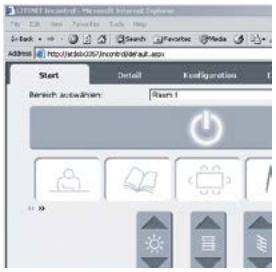
This phenomenon is especially pronounced in the case of patients suffering from Alzheimer's or dementia. Studies conducted in various care homes show that high lighting levels in day rooms have a positive, stimulating effect on sleep-wake rhythms. Lighting levels up to 1500 lx are recommended at certain times. Colour temperatures that mimic natural changes over the course of a day have a positive impact. Warm light in the morning and evening fosters a sense of well-being and relaxation. Bluish light in the late morning and at midday has a stimulating effect. This daylight feel makes care patients more mobile, more active and more communicative. These increased activity levels result in the body producing more melatonin in the evening; this makes residents feel tired in the evening and therefore more likely to get a good night's sleep. This provides better "cues" for the body clocks of elderly people in a way that they have become accustomed to during their active working lives.

High-quality lighting is also effective in hospitals, especially in intermediate and intensive care units. We perceive light subconsciously, and it ensures well-balanced biological rhythms. Natural light in waiting areas and patients' rooms creates a sense of ease and promotes subsequent patient convalescence and health.

Product recommendations

CIELOS multicolor |
Surface-mounted luminaire

LUXMATE LITENET | Lighting management



Helios Care Home Goldach | CH
Architecture: F. Bereuter AG, Rorschach | CH
Lighting solution: special-design luminaires

1 Attractiveness and well-being
Increased well-being

- **Lighting scenes that feature variable light intensities, directions of light and light colours create feel-good atmospheres**
- **Light and materials can merge into a single entity, thus lending even sterile spaces a homely note**
- **Individually adjustable daylight integration speeds up patient convalescence**

Patients' rooms play a crucial role in the recovery process. The right light can make a perceptible contribution towards making patients feel secure and at ease, despite being in an unfamiliar environment. A pleasant atmosphere also leaves its mark on doctors who provide treatment, care staff and visitors.

Light becomes a feel-good factor if the light colour, direction of light and its intensity are appropriate to particular situations and produce various room scenes: at visiting times, communicative lighting with daylight-like, natural light and well-balanced light distribution has a highly agreeable effect. In contrast, a more muted lighting scene is fine for reading. Simple, intuitive operation makes sure that even people with reduced mobility and physical and psychological health problems can operate the lighting system with no difficulty.

A light colour that interacts with the furniture, materials and colour schemes in the room periphery gives a room a homely feel. This is the approach that is also adopted by products that integrate light and a medical supply system in a wall-mounted system that hides the technology from view. Premium products are also distinguished by time-saving installation and easy operation for lighting control that integrates daylight and delivers the desired lighting scene at the press of a button.

Product recommendations

IMWS | Medical supply system

ZBOX | Lighting management

Green Hospital Cooperation
Lighting solution: IMWS integrated medical wall-mounted system

1 Attractiveness and well-being
Improving convenience

Casa di Cura privata “Sanatrix”, Rome | IT
Architecture: STA Nervi-Feliciangeli, Rome | IT
Lighting solution: LIGHT FIELDS surface-mounted luminaires, CIELOS luminous ceiling, SLOTLIGHT light lines, ONLITE RESCLITE emergency luminaires, LUXMATE BASIC lighting control system

- **Well-balanced luminance levels are perceived as pleasant**
- **Daylight has a natural, agreeable effect**
- **Simple operation is a basic requirement**

Well-balanced luminance levels are easiest achieved by using several light components: luminaires with visible luminance levels, for instance, are an ideal addition to vertically illuminated surfaces and help improve human spatial perception. Adequate luminance levels are required in meeting areas to ensure straightforward orientation and safe movement. The fact that corridors are places where people meet and communicate in many hospitals, retirement homes and care homes and are frequented by many patients with impaired vision is a powerful argument in favour of a high-quality lighting solution. The legally required minimum illuminance in corridors is therefore inadequate. In corridors, Zumtobel recommends luminance of around 300 lx with special attention being paid to uniformity.

Light and a sense of well-being are always closely linked. If insufficient daylight is available, artificial lighting must compensate for this and provide optimal illumination with high levels of visual comfort. While daylight is inherently variable, an intelligent controller is required to be able to adapt artificial lighting to suit the time of day. In areas that are used by the public, an automatically adjusted lighting level is perceived as being pleasant. In contrast, individuality needs to assert itself in spaces used by individuals such as patients' rooms. Logical, simple operation that even the elderly, frail or visually impaired and dementia patients can understand is the top priority in these situations.

Product recommendations

PERLUCE | Surface-mounted luminaire

ONDARIA | Circular luminaire

Maldegem Care Home | BE
Architecture: AIKO Architecten & Ingenieurs, Maldegem | BE
Lighting solution: PANOS downlights, COPA pendant luminaires, SLOTLIGHT light lines, CLARIS pendant luminaires, KAREA wall-mounted luminaires

1 Attractiveness and well-being
Ensuring safety

- **Patients and staff alike can find their way round more quickly**
- **Avoiding glare means preventing accidents**
- **Uniform brightness enhances lighting comfort**

Besides the way that space is divided up and interior design, lighting and luminaires are important factors when it comes to ensuring straightforward orientation in buildings. The elderly are especially susceptible to glare and this can have negative consequences under some circumstances. Glare reduces a person's perception of their environment. A good lighting solution that takes into account surfaces and their reflectiveness precludes the possibility of glare.

Uniform brightness makes potential danger spots clearly visible. It helps negotiate shadowy or dark areas which the elderly are prone to regard as trip hazards. Good lighting becomes more important as we age. This is why the brightness levels specified by standards and regulations are not sufficient to ensure requisite levels of safety in care facilities. This safety can only be achieved through a well-balanced, bright lighting scene. Emergency and escape sign luminaires that are easy to identify from afar and brighten up a room sufficiently in an emergency make finding an escape route safer and faster.

Product recommendations

ONLITE ERGOSIGN |
Escape sign luminaire

SLOTLIGHT II | Recessed luminaire

Gmunden Regional Hospital | AT
Architecture: fasch&fuchs architekten, Vienna | AT
Lighting solution: PANOS downlights, TECTON Tetris continuous row system, SLOTLIGHT light lines, RAIN moisture-proof luminaires, PURELINE bedside luminaires, CONBOARD medical supply units, LUXMATE LITENET lighting management system


Klin. Sozialarbeit

Space and capacity
Support for doctors and care staff

“After a familiarisation period that lasted around 2 to 3 weeks, the new integrated medical wall-mounted system made our work significantly easier. Connecting medical supplies and medical equipment is better and easier to monitor than before. Consistent operation and a standard lighting situation is a particular advantage when working nights. The orientation night light installed laterally behind the head ensures that patients now enjoy an uninterrupted night’s sleep; this was not always the case when we used a conventional end-of-the-bed solution. Cleaning staff reckon that cleaning and disinfection can be completed faster and monitored more effectively than in the case of surface-mounted units. The design of the media wall helps provide an environment that is highly appreciated by staff and patients alike. The entire interior design brings a calming feel and a hotel-like atmosphere.”

Ingrid Fleckeisen
Nurse I AK Seligenstadt near Frankfurt, Asklepios I DE

Offenbach Clinical Centre | DE
Architecture: woernerundpartner, Frankfurt | DE
Lighting solution: PANOS downlights, SLOTLIGHT recessed luminaires, LINARIA batten luminaires, ARCOS spotlights, CLEAN supreme cleanroom luminaires, CONBOARD medical supply units, PURELINE surface-mounted luminaires

In nursing and care settings, one of the most important requirements is to ensure that all workflows everywhere run smoothly at all times. Responsibility for patients and making sure they are safe are paramount. Modern technologies and methods are shaping health care and are also making new demands on lighting. Imaging diagnostics requires low lighting levels, for instance. At the same time, glare-free light and extremely good colour rendering are needed in order to be able to identify details and colours with high contrast.

Operations and treatment are now frequently performed at night for capacity reasons, in emergencies and for economic reasons. Night shifts and round-the-clock working are routine in hospital and care settings. This has an adverse effect on staff's sleep-wake rhythms. However, the right light can boost alertness and activity levels. It helps ward off fatigue without any harmful effects on health.

2 Space and capacity
Making work easier

- **Functional, glare-free lighting is indispensable in workplaces where there are exacting visual requirements**
- **Emotional accent lighting provides welcome contrasts in sterile environments**
- **Lighting scenes at the push of a button increase convenience for both patients and staff**

Examination and treatment areas are primarily designed along functional lines. Emphasis is placed on usage, workflows and medical and technical equipment. Electronic displays on monitoring equipment, mechanical adjustment controls and computers are now all standard. Generally speaking, this calls for a well-balanced lighting level, good colour rendering and absence of glare in much the same way as in office workplaces. High-quality lighting solutions prevent distracting reflections and glare on the surface of equipment, on monitors and on x-ray image viewing equipment. Lighting systems with direct/indirect light distribution and the right light colour meet these requirements very capably and provide an agreeable room ambience. This is something that is also highly appreciated by patients. Spotlights or downlights provide positive lighting accents that accentuate architecture.

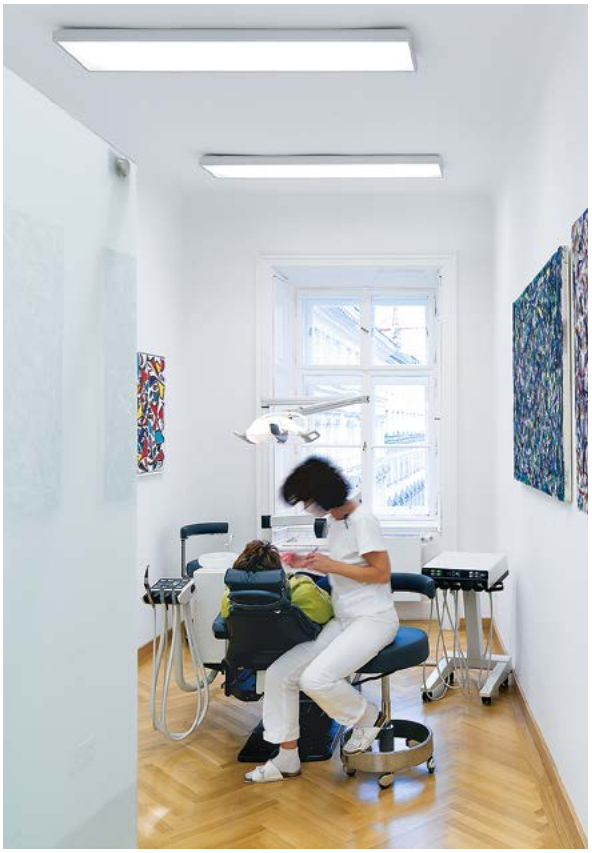
Emergency cases, examinations and treatment or room cleaning: the diverse range of purposes for which treatment and examination rooms are used demands individually adapted lighting scenes – at the push of a button. Many application areas involve particular visual requirements that demand higher lighting levels than those provided by general lighting. It is advisable to use systems that are especially flexible, mobile and deliver exclusively direct light in such areas. Specific, less brightly lit areas with light levels lower than those of the general lighting system are possible.

Product recommendations

LIGHT FIELDS |
Surface-mounted/pendant luminaire

CIRIA | Control unit

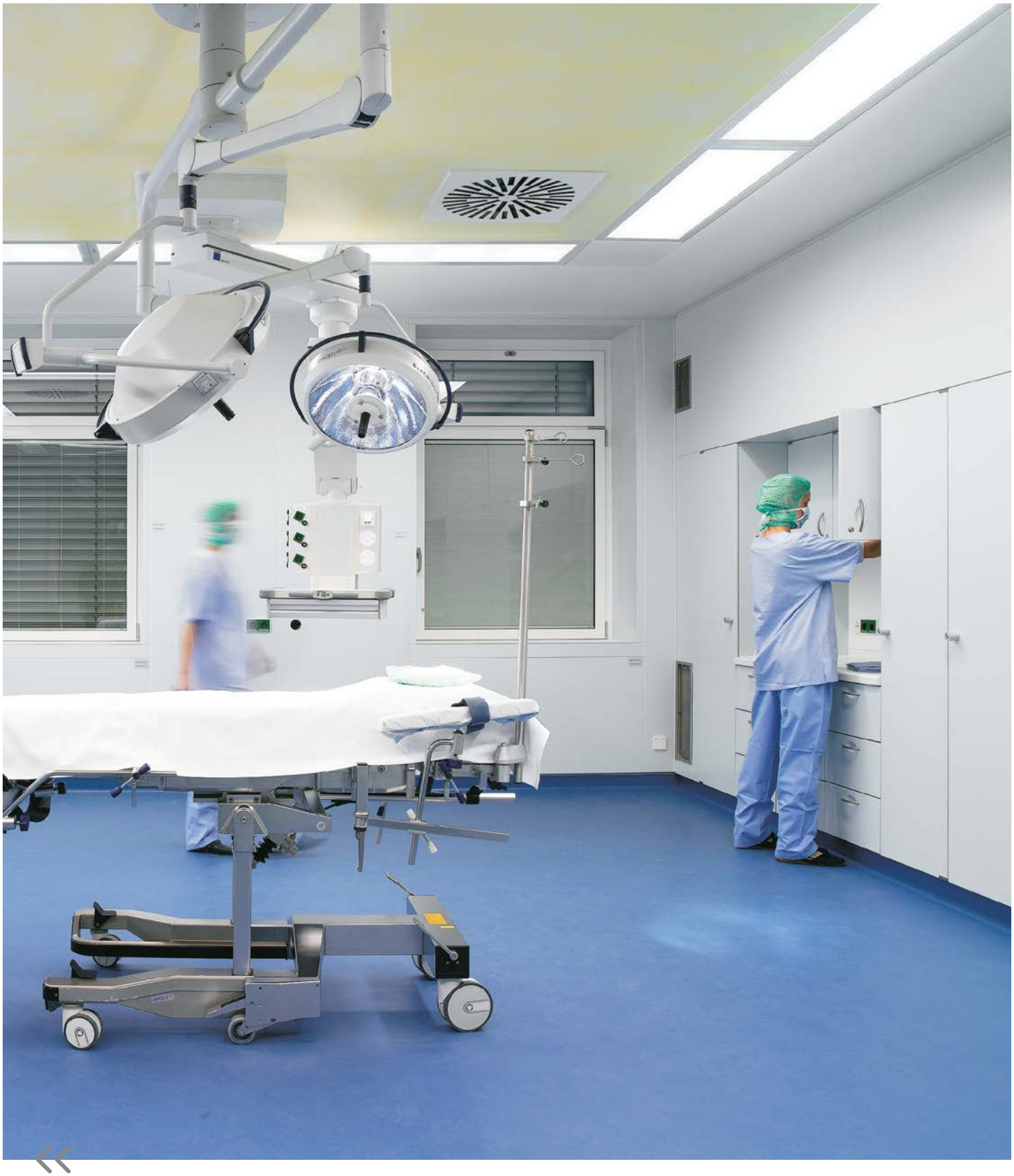
Dr. Fahrenholz Dental Practice, Vienna | AT
Architecture: Architectural engineer Josef Schiessl, Vienna | AT
Lighting solution: LIGHT FIELDS surface-mounted luminaires



Dr. Martin Ladentrog Dental Practice, Graz | AT
Architecture: H. Fritz, technical office for interior design, Graz | AT
Lighting solution: LIGHT FIELDS surface-mounted luminaires,
KAVA wall-mounted luminaires, SLOTLIGHT light lines

2 Space and capacity

Recognising details



- **High, uniform illuminance creates ideal working conditions**
- **Lighting scenarios can be adapted to suit particular activities**
- **Proper lighting combats fatigue**

The range of operations performed has grown significantly in recent years. Dimmable lighting solutions that provide various lighting scenarios have long been a standard feature. It is taken for granted that operating theatres are uniformly illuminated with high illuminance levels. An average lighting level of 2000 lx is recommended in order to assist visual adaptation.

Minimally invasive operations are nowadays often performed using green light lasers requiring low illuminance levels. Heavily dimmed light makes it easier to assess contrasts on monitor displays. Nevertheless, the surgeon's eyes have to constantly adapt to different light levels and this causes fatigue. There is often insufficient daylight in operating theatres. This makes it hard for medical staff to remain alert and attentive. Varied light can help prevent this. Coloured lighting scenes of the kind produced by RGB-controlled LED luminaires visually lift a room, for instance. Lighting concepts that feature variable colour temperatures respect the qualities of daylight, aid concentration and improve well-being.
Scrupulous hygiene requirements explain the huge importance attached to maintenance and cleaning work. The expense this involves can be reduced significantly by installing powerful, efficient LED cleanroom luminaires. This makes it possible to boost cost-effectiveness and sustainability at the same time.

Product recommendations

CLEAN advanced | Cleanroom luminaire

CLEAN supreme | Cleanroom luminaire

Gynaecological Clinic Freiburg | DE
Architecture: Gaiser u Partner, Karlsruhe | DE
Lighting solution: PANOS downlights, FEL recessed luminaires, FEC recessed luminaires, CLEAN cleanroom luminaires, PURELINE surface-mounted luminaires, TECTON continuous row luminaires, STARFLEX fibre-optic system

2 Space and capacity
Taking time into account

Bolzano Central Hospital | IT
Architecture: Ing. Claudio Scanavini, Bolzano | IT
Lighting solution: ACTIVE LIGHT WALL luminous ceiling, PURELINE lighting and supply system, CLARIS II surface-mounted luminaires, PERLUCE diffuser luminaires, LUXMATE PROFESSIONAL lighting management system

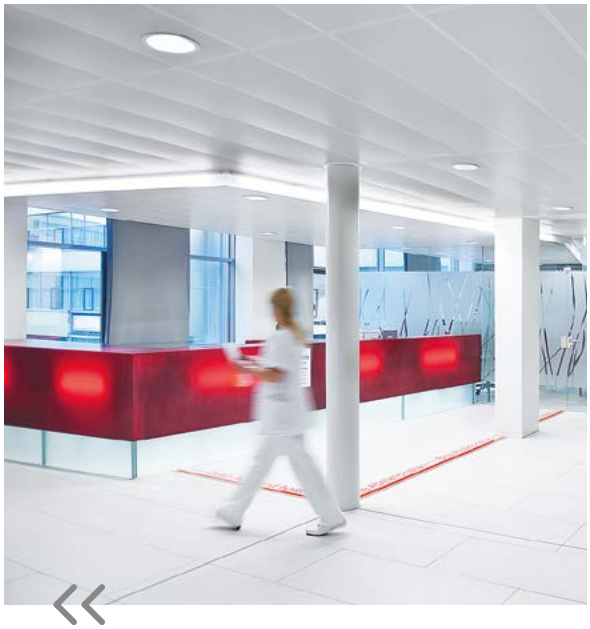
- **Constantly working day shifts and night shifts makes people tired and leads to mistakes**
- **Slowly resetting the human body clock makes night work easier**
- **Higher light intensities boost staff's activity and alertness levels**

Working night shifts is par for the course in hospitals and care facilities. Staff who are on duty are always expected to be active and alert. Mistakes must be avoided at all cost because they can have devastating consequences. Nevertheless, human biorhythms are not designed for night shift working. Pulse rate and body temperature automatically decrease at night. Avoiding constant changeovers between working early and late or daytime and night-time shifts has beneficial effects. Erratic working hours disrupt the body's natural rhythms and result in sleep disturbances and poor concentration. For people who work shifts, it is therefore a good idea to adjust their internal clock. As in the case of jetlag, this takes a few days. The right lighting assists this adjustment. High light intensities suppress the production of melatonin and ensure alertness when on duty. Nevertheless, high intensities must be used carefully. Lighting control that adjusts light intensities flexibly and ensures smooth transitions between corridors and patients' rooms makes working easier and makes sure that patients are disturbed less frequently. Visual comfort improves when the eye does not have to accommodate to abrupt transitions between bright and dark environments.

Product recommendations

PANOS infinity Tunable White | Downlight

LUXMATE EMOTION | Touch panel



Gmunden Regional Hospital | AT
Architecture: fasch&fuchs architekten, Vienna | AT
Lighting solution: PANOS downlights, TECTON TETRIS continuous row system, SLOTLIGHT light lines, RAIN moisture-proof luminaires, PURELINE bedside luminaires, CONBOARD medical supply units, LUXMATE LITENET lighting management system

2 Space and capacity
Being flexible

- **Modular lighting and medical supply units adapt flexibly to suit the way a room is being used**
- **Modular lighting solutions meet all needs comprehensively, from medical supply units in patients' rooms through to lighting in underground car parks, and even across different projects**
- **Intelligent lighting control adjusts light to suit the visual requirements of the patient or doctor at the press of a button**

Lighting design starts at the spatial planning stage. For instance, once it is known how many beds there will be or where monitors will be located in an operating theatre, it is easier to think about where to place light switches. Thinking along modular lines is a tried-and-tested lighting approach. Individually designable medical supply units for patients' rooms turn lighting into an integral part of a room. Concealed from the patient, technology is discreetly hidden behind a cover or side edge.

Including lighting control in plans at an early stage ultimately provides greater scope for flexibility. "Light on demand" is the watchword of modern lighting solutions. Lighting is adjusted to suit a particular visual task at the push of a button and is ideally supplemented by daylight sensors and presence detectors or an automatic timer. It is important that user interfaces are simple. The wide variety of different lighting scenes that are available will only be used if operation is simple. Additional scenes can be developed retrospectively for intelligent lighting solutions in order to optimise the energy efficiency or economic efficiency of a building, for instance.

Product recommendations

CONBOARD NP | Medical supply system

SINUS | Medical supply system

LUXMATE DIMLITE | Lighting management

Hamburg-Eppendorf University Clinic, Hamburg | DE
Architecture: Nickl & Partner Architekten, Munich | DE
Lighting designer: Ebert und Partner, Nuremberg | DE
Lighting solution: CLARIS surface-mounted luminaires, CLEAN cleanroom luminaires, ONLITE escape sign luminaires, PERLUCE diffuser luminaires, CONBOARD medical supply system, CUREA bedside luminaires, PANOS downlights, TECTON continuous row luminaires, SLOTLIGHT light lines

Schwarzwald-Baar Klinikum (Black Forest/Baar Hospital), Villingen-Schweningen | DE
Architects: HDR TMK Planungsgesellschaft mbH, Düsseldorf | DE
Electrical consultants: Sütterlin und Partner GbR, Freiburg | DE
Lighting solution: CLEAN cleanroom luminaires, PURELINE lighting and medical supply units, MIREL FED, FEL, FEW louvre luminaires

Cost savings
Added value for operators and investors

“Above all, life-cycle costs will be a decisive criterion for the future design of lighting installations. Features such as durability, energy efficiency, easy installation and maintenance make a real difference. A combination of energy-efficient luminaires and optimised control provide considerable scope for potential energy savings. In my opinion, the cost of ownership of a luminaire after 25 years is what counts.”

Herbert Feurstein
Chief Technical Officer | Bregenz Regional Hospital

Campus Biomedico di Roma | IT
Architecture: Studio Architetti Associati, Pesch. Borromeo | IT
Lighting solution: COPA high-bay luminaires, PANOS downlights, MELLOW LIGHT IV recessed luminaires, CONBOARD lighting and supply units (special design)

The various reference groups involved, from patients to investors, place different requirements on lighting concepts. Great emphasis is put on the health and well-being of persons who require care and care staff. Lighting is also a matter of cost, especially the annual maintenance and electricity costs that are incurred in order to run the lighting system. Energy-efficient planning right from the outset lays the foundation for achieving sustainable success. Daylight-based control and individually retrievable lighting scenes are an integral part of such planning. They make it possible to improve convenience while cutting energy consumption, thus providing a solution that delivers long-term satisfaction.

3 Cost savings
Reducing energy consumption

- **Efficient luminaires and light sources reduce energy consumption considerably**
- **Intelligent lighting control switches light off when it is not needed**
- **Upgraded or modernised lighting solutions are a more economically efficient solution overall**

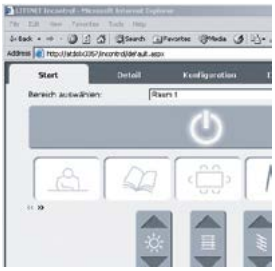
Hospitals and care facilities with several hundred beds use large amounts of energy for heating, ventilation, air conditioning, lighting and operating medical equipment. The needs of patients and staff have to be met round the clock. This means that older buildings, in particular, and their supply systems and technologies are no longer fit for purpose by today's standards. The result: high energy consumption and excessive costs.

Lighting has a big impact on the total energy balance. Saving energy starts with using modern luminaire technologies. Modern light sources and luminaires reduce energy consumption while delivering significantly improved lighting quality. Dimming unnecessary light to minimum levels is especially efficient. Presence detectors and daylight-based control make this objective much easier to achieve. Lighting scenes that are precisely adjusted to cater for visitors' and patients' needs help use energy in a targeted manner.

Innovative LED solutions are especially recommended in clinics and care facilities. They are many times more efficient and longer lasting than standard lighting. It is possible, for instance, to install high-quality LED ambient lighting that pays for itself relatively quickly, thanks to lower operating costs.

Product recommendations

LUXMATE LITENET | Lighting management



LUXMATE daylight measuring head | Sensor

Bregenz Regional Hospital | AT
Architecture: Baumschlager Eberle, Lochau, AT
Lighting solution: PURELINE lighting and supply units, PANOS downlights, MELLOW LIGHT IV recessed luminaires

3 Cost savings
Improving cost-effectiveness

- **Economically efficient solutions start with efficient light sources and modern, dimmable ballasts**
- **Easy-to-install and durable LED luminaires cut operating costs**
- **Modern optics, lenses and reflector technologies ensure maximum energy efficiency with equivalent or even better lighting quality**

Slashing energy consumption in efforts to counter rising electricity prices is the order of the day. The cornerstone of this strategy is selecting the optimal light source combined with an efficient ballast. LED technology is already mature enough to allow LED luminaires to be used as replacements for conventional luminaires in many applications. Combining LEDs with dimmable, electronic ballasts optimises efficiency. Premium LED luminaires have the advantage of requiring hardly any maintenance. Moreover, their long service life and constant luminous flux means less frequent replacement. Intelligent systems with optimised optics, high-grade lenses and the latest reflector technology direct light perfectly so that it can fulfil its task in a targeted manner without any losses.

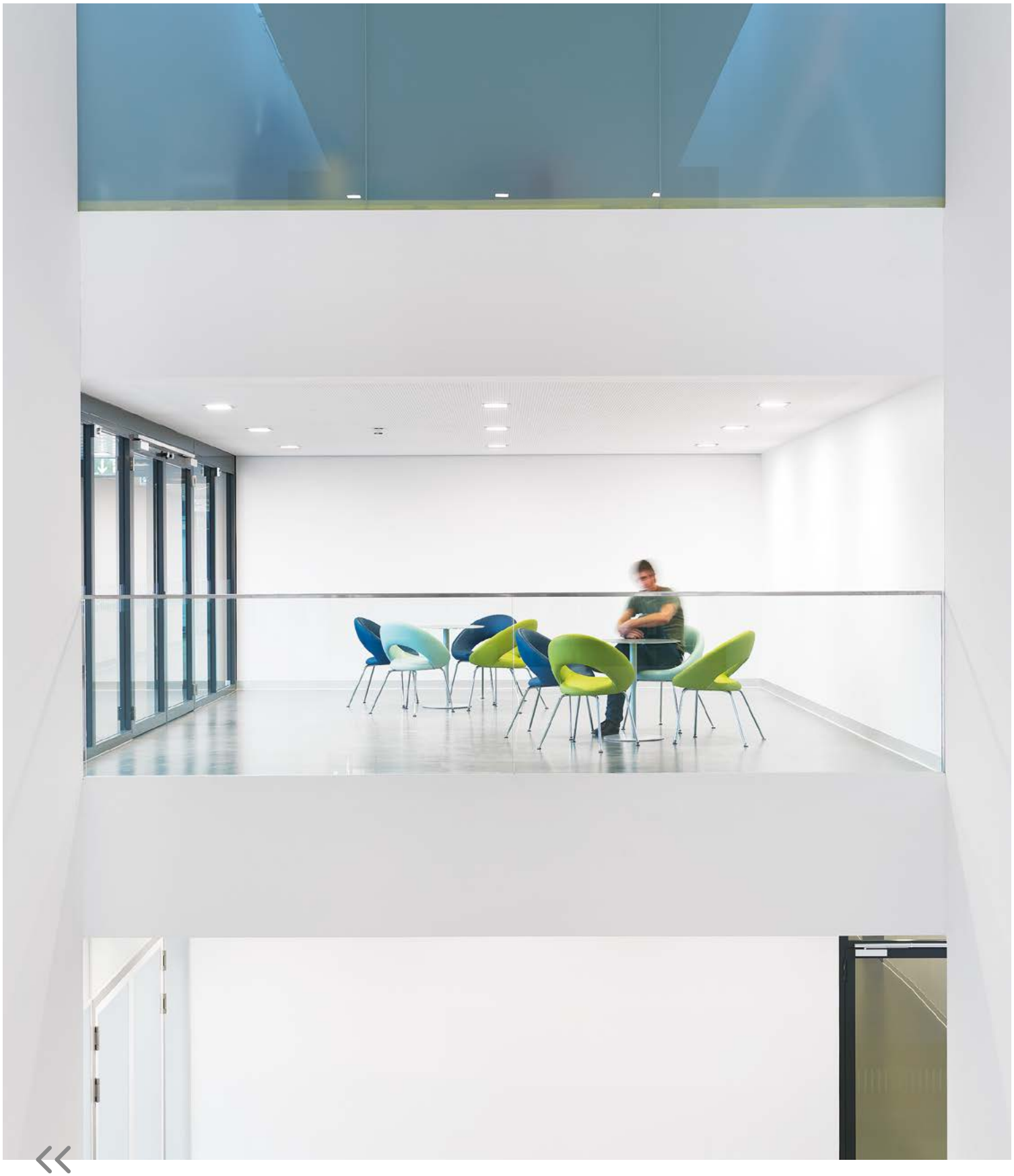
Investments in modern LED technologies have short payback periods, which even makes it worthwhile to refurbish existing lighting systems. Combining these luminaires with a lighting control system results in maximum energy efficiency.

Product recommendations

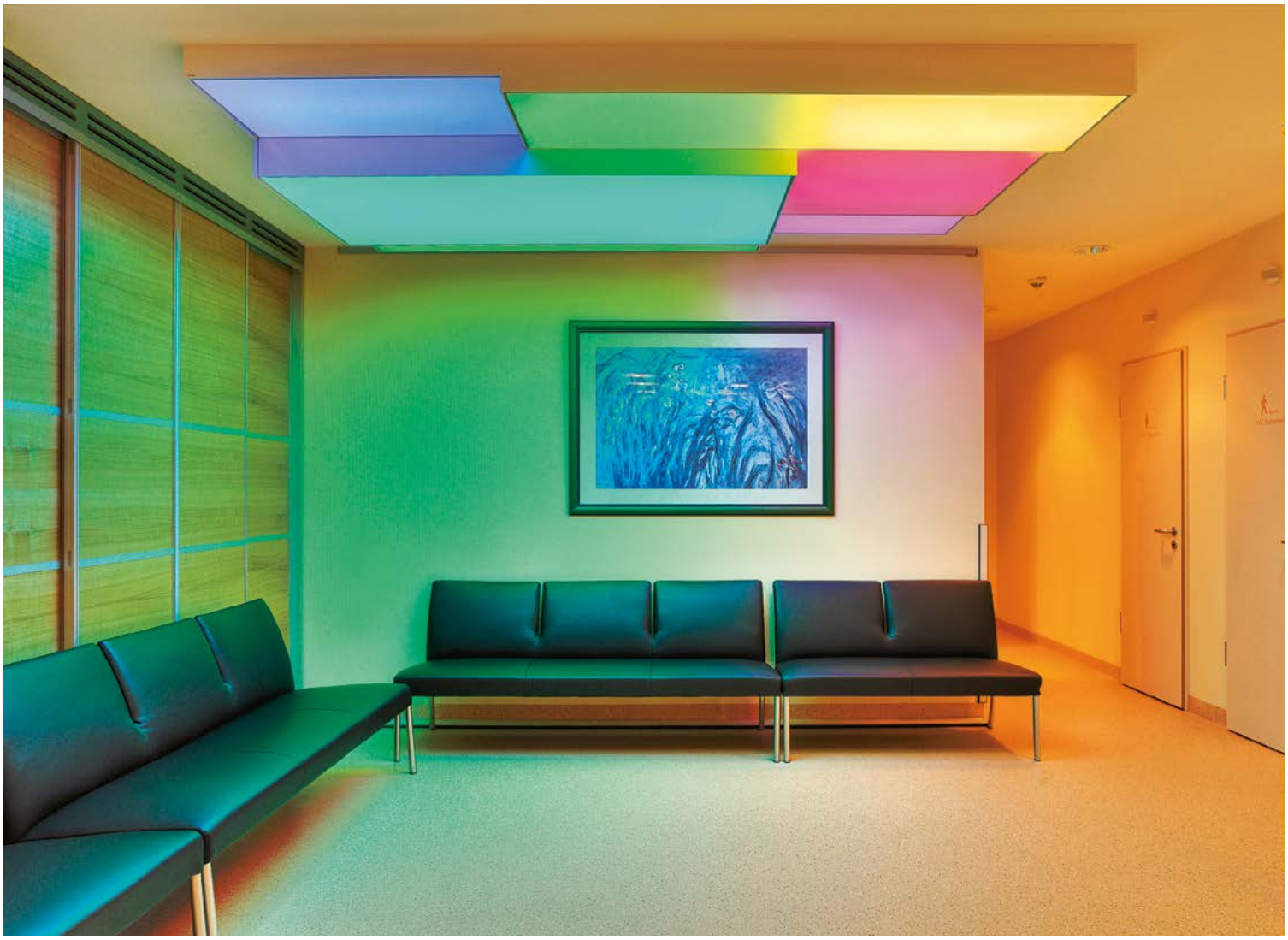
PANOS infinity | Downlight

LUXMATE ED-SENS | Presence detector

Baar Central Hospital | CH
Architecture: Burckhardt + Partner AG, Zurich | CH
Lighting solution: PANOS Q downlights, CLEAN cleanroom luminaires, TECTON continuous row luminaires



3 Cost savings
Image enhancement



- **Good light makes a great impression**
- **Light defines corporate identity**
- **Light shows architecture to full effect**

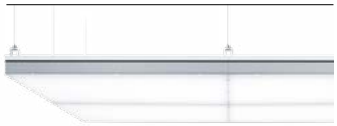
Architecture acts as a building's ambassador. The impression made on patients and visitors is shaped by what they see and view and by their first impressions of a facility's premises. Coherent, carefully selected interior decoration helps a hospital or care facility convey the values it wants to get across. Architecture-oriented light and modern luminaires enhance a building and enhance a facility's image. The fact that lighting solutions are not merely functional and in conformity with standards creates a positive impression. Light that blends into the architecture matter-of-factly, yet nevertheless stands out from it, makes all the difference.

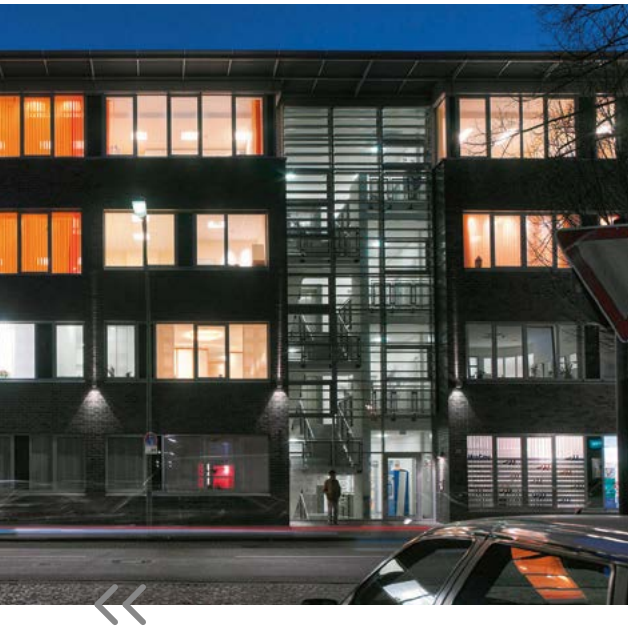
Coloured light is used to convey a sense of character or to accentuate a facility's image. Colour changing light can emphasise the distinct appearance of a hospital or care facility, for instance. This creates a sense of identity and symbolises a feeling of belonging – to a town, to a business or an organisation.

Product recommendations

PERLUCE | Surface-mounted luminaire

CIELOS | Luminous ceilings





Herne Dialysis Centre | DE
Architecture: Ludes Architekten und Ingenieure, Recklinghausen | DE
Lighting solution: ACTIVE LIGHT WALL luminous ceiling, MELLOW LIGHT IV recessed luminaires, PANOS downlights, LEDOS B recessed floor luminaires, PHAOS wall-mounted luminaires, SLOTLIGHT light lines, LUXMATE PROFESSIONAL, LUXMATE EMOTION lighting management systems

3 Cost savings
Taking a holistic view

- **Different application areas impose different requirements**
- **With intelligent building services management, general, emergency and safety lighting form a single unit**
- **Light as a feel-good factor is becoming more and more important**

A wide variety of application areas are encountered in hospitals and care homes. This results in complex lighting projects. Things start with the exterior lighting in the surrounding green spaces, the entrance and the helipad. Lighting concepts then extend into horizontal and vertical manoeuvring areas, administrative areas, examination and treatment rooms, laundry and kitchen areas, which sometimes have an industrial look, and other spaces. A lighting solution ultimately extends into patients' rooms and care rooms, as well as functional and operating areas.

A central building services management capability is recommended for handling the different usage times and requirement profiles of various premises. Besides retrieving special situation-related lighting scenes, it is also possible to monitor the system in respect of maintenance cycles and repair work. Faulty lamps, system incidents and emergency and safety lighting tests are performed centrally and recorded in logs. These systems can be used effectively to integrate daylight, presence detectors or constant luminance technology, especially nowadays, given the exemplary role played by "green" buildings.

Light as an emotionally expressive design component is becoming increasingly important and can be contrasted with the strictly functional and technical aspects of lighting. Patients and residents expect to feel at ease in hospitals and care homes and, just like staff, would rather spend time in pleasant surroundings.

Product recommendations

SCUBA LED |
Diffuser luminaire

ONLITE CENTRAL eBox |
central supply system

Campus Biomedico di Roma | IT
Architecture: Studio Architetti Associati, Pesch. Borromeo | IT
Lighting solution: COPA high-bay luminaires, PANOS downlights, MELLOW LIGHT IV recessed luminaires, CONBOARD lighting and supply units (special design)

Tour around a hospital
Steps towards a trend-setting lighting solution

Discovering potential energy savings

On the next pages we will take you on a tour round a typical hospital and show you how rooms can be assessed against three criteria: cost, capacity, attractiveness & well-being. LED lighting, with or without a control system, reveals potential savings compared with a conventional lighting solutions that use fluorescent lamps.

Energy and CO_2

Using highly efficient, maintenance-free LED lighting cuts operating and maintenance costs. These energy savings result in drastic reductions in CO_2 emissions over a system's 20-year life cycle.

Lighting quality

Despite this, lighting quality is just as good or even better because easily controllable, highly adjustable LED lighting can specifically cater for various types of usage and different needs. This enhances people's sense of well-being, thereby making a hospital a more attractive location for patients and staff alike.

Flexibility

Thanks to the small size and individual controllability of LEDs, LED lighting and intelligent lighting control enable space to be used more flexibly. This makes it possible to respond to fluctuating capacity requirements or changing needs without the need for physical retrofitting or extra investment.

ELI-LENI Calculator
The ELI-LENI Calculator calculates two key indicators of a lighting solution:
- The Lighting Energy Numeric Indicator (LENI), based on the specifications in EN 15193
- Lighting quality (ELI)

zumtobel.com/service

ELI checklists
Assessing lighting quality

Lighting quality is described in terms of visual performance, visual comfort and effect on vitality and flexibility.

Visual performance

How well should the visual task be recognised?
Explanation: Lighting in conformity with relevant standards is decisive for ensuring that the visual task can be identified and the related activities can be carried out. Consideration of the traditional quality characteristics of lighting has a major impact on visual task performance.

At the workstations, …	
… standard visual tasks have to be performed.	-2 -1 0* 1 2
… visual tasks are the same across the whole area.	-2 -1 0 1 2
… colour distinction is required to a common extent.	-2 -1 0 1 2
… no extraordinary changes of viewing direction occur.	-2 -1 0 1 2
Within the visual task area, …	
… hard shadows must be avoided.	-2 -1 0 1 2
… the field of vision should be free from sources of glare.	-2 -1 0 1 2
… reflections must be avoided.	-2 -1 0 1 2

* Minimum criterion, corresponds to values specified in the standards

Mean value Visual task

Visual comfort

How much visual comfort is required in the room?
Explanation: Light is needed not only in the visual task area, but also for perception in the room. Rooms should be illuminated with uniform brightness and lighting balance.

In the project planned, …	
… users must be particularly protected from annoying sources of glare.	-2 -1 0* 1 2
… it will be particularly important to identify three-dimensional structures in the room.	-2 -1 0 1 2
… the room should provide a bright and inviting impression.	-2 -1 0 1 2
… daylight must be taken into account.	-2 -1 0 1 2
… there must be no flickering light.	-2 -1 0 1 2
… larger dark areas should be avoided.	-2 -1 0 1 2
In the area around the visual task, the room should be illuminated uniformly.	-2 -1 0 1 2

* Minimum criterion, corresponds to values specified in the standards

Mean value Visual comfort

Vitality

How positive should the light's influence be on people?
Explanation: Light significantly influences people's activity and sense of wellbeing. Moreover, it has a positive impact on their health and may even enhance or influence biological processes.

The lighting concept …	
… should make people feel good.	1 2 3 4 5
… should stimulate people.	1 2 3 4 5
In the project planned, …	
… it should be possible, in particular, to adjust the lighting to the brightness level required.	1 2 3 4 5
… the effect to be created should be as natural as possible.	1 2 3 4 5
… people's circadian rhythm should be particularly taken into account.	1 2 3 4 5
In the project planned, special emphasis is put on protection against sources of annoyance or adverse health effects.	1 2 3 4 5

1 = does not apply at all; 5 = applies completely

Mean value Vitality

Individuality and flexibility

To what extent should the lighting adjust to my personal requirements?
Explanation: Varying visual requirements, visual tasks or periods of use call for options to individually influence one's lighting situation. Sensors and control systems help users adjust the lighting situation to their personal needs.

In the project planned, …	
… the user should be able to personally influence the lighting situation.	1 2 3 4 5
… a variety of tasks must be taken into account.	1 2 3 4 5
The lighting should be switched automatically.	1 2 3 4 5
Artificial lighting should be controlled by daylight sensors.	1 2 3 4 5
The lighting should be controlled on the basis of time.	1 2 3 4 5
Any future layout changes should be taken into account.	1 2 3 4 5

1 = does not apply at all; 5 = applies completely

Mean value Empowerment

50 % reduction in CO_2 emissions thanks to LED lighting alone

Examples taken from various application areas

Application	Luminaires before non dimmable	Luminaires after dimmable	Connected load	CO_2-reduction without lighting management
Entrance area reception	50 downlights 2 x 26 W TC-D	15 CIELOS LED 33 W 22 SLOTLIGHT II LED light lines 36 W 8 SLOTLIGHT II LED pendant luminaires 36 W	before: 3120 W after: 1680 W	**47 %**
Corridor	11 diffuser luminaires 2 x 36 W T26	19 SLOTLIGHT II LED light lines 24 W 2 PURESIGN 150 LED 4.5 W 1 RESCLITE escape LED 4.8 W	before: 946 W after: 513.8 W	**47 %**
Cafeteria	21 downlights 2 x 26 W TC-D	9 ONDARIA LED Ø 440 31 W 4 ONDARIA LED Ø 640 60 W	before: 1310.4 W after: 497 W	**63 %**
Waiting area	12 downlights 2 x 26 W TC-D	6 PERLUCE LED 50 W 2 APHRODITE LED 40 W	before: 748.8 W after: 380 W	**60 %**
Examination room	6 louvre luminaires 4 x 18 W T26	6 LIGHT FIELDS LED evolution 36 W	before: 528 W after: 222 W	**57 %**
Surgery hallway	16 downlights 2 x 26 W TC-D	16 PANOS infinity LED RA 90 23 W	before: 896 W after: 368 W	**63 %**
Pre-op room	2 cleanroom luminaires 3 x 36 W T26	2 CLEAN advanced LED 59 W	before: 259.2 W after: 118 W	**53 %**
Operating theatre	12 cleanroom luminaires 3 x 58 W T26	12 CLEAN supreme 3 x 54 W T16	before: 2412 W after: 2064 W	**15 %**
Two-bed room	2 room lights 2 x 58 W T26 2 reading lights 1 x 36 W TC-L 1 night light 1 x 5.4 W TC 2 downlights 2 x 18 W TC-D	2 room lights SINUS LED 57 W 2 reading lights SINUS LED 12 W 1 night light LED 1,2 W 2 FD 1000 LED 14 W	before: 455 W after: 167.2 W	**63 %**
Single-bed room	1 room light 2 x 58 W T26 1 reading light 1 x 36 W TC-L 3 downlights 2 x 18 W TC-D	1 room light IMWS LED 71 W 1 reading light IMWS LED 16 W 2 PANOS infinity LED TW 22 W	before: 255 W after: 131 W	**59 %**
Office	4 louvre luminaires 4 x 18 W T26	4 MELLOW LIGHT V LED 37 W	before: 352 W after: 160 W	**55 %**


Pre-op room
Operating theatre
Surgery hallway
Office
Waiting area
Examination room
Entrance area | reception
Patient room
Single-bed room
Corridor
Cafeteria
Patient room
Two-bed room

Entrance area | reception comparison example

CIELOS LED MONOCOLOR, modular lighting system
SLOTLIGHT II LED, light line
SLOTLIGHT II LED, pendant luminaire

CIELOS monocolor
Modular LED lighting system

SLOTLIGHT II
LED light line

SLOTLIGHT II
Pendant LED luminaire

The lighting in the entrance area forges a link between individuals and the architecture. The reception area creates the first lasting impression and thus makes a considerable contribution towards establishing the public face of a facility. The primary purpose of the lighting concept in an entrance area is to lighten up the mood of people entering a hospital – in the most literal sense of the word. The CIELOS pool of light acts like an opening and enhances a welcoming ambience. The SLOTLIGHT luminaires play a subordinate role in the entrance area while making it easier for people to find their bearings. This ensures that emotionally and physically stressed visitors soon feel at ease. A lighting management system not only makes it possible to save energy, it also ensures that artificial lighting levels are optimally adjusted to suit particular surroundings and available daylight.

Underlying conditions

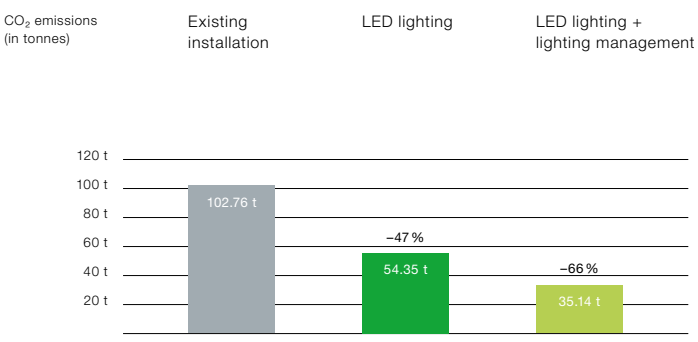
Luminaires before
50 downlights 2 x 26 W TC-D
Luminous flux of luminaires: 1829 lm
Luminous efficiency of luminaires: 30 lm/W

Luminaires after
15 CIELOS LED 31 W
Luminous flux of luminaires: 3202 lm
Luminous efficiency of luminaires: 2103 lm/W
22 SLOTLIGHT II LED light lines 36 W (2574 lm / 65 lm/W)
8 SLOTLIGHT II LED pendant luminaires 36 W (2574 lm / 65 lm/W)

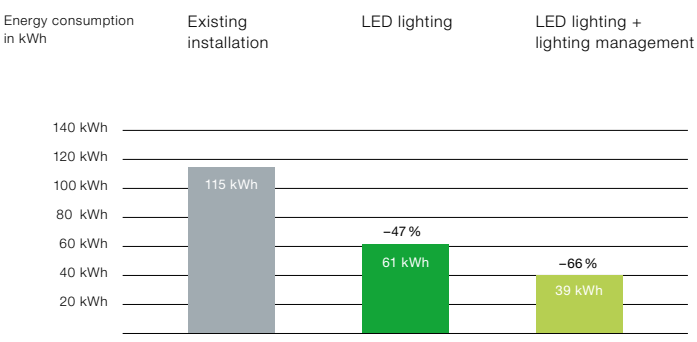
Lighting management
DIMLITE 4-ch multifunctional control unit with daylight-based Circle KIT control point

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

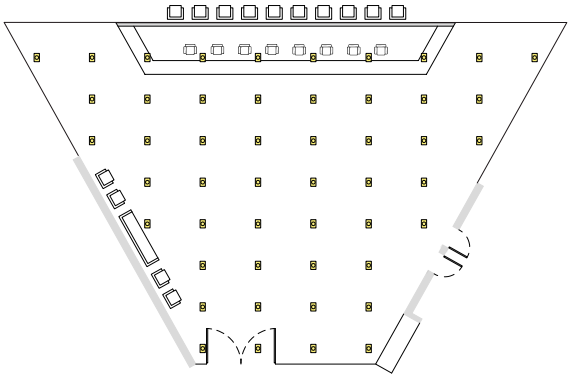


Average energy consumption per m² and year

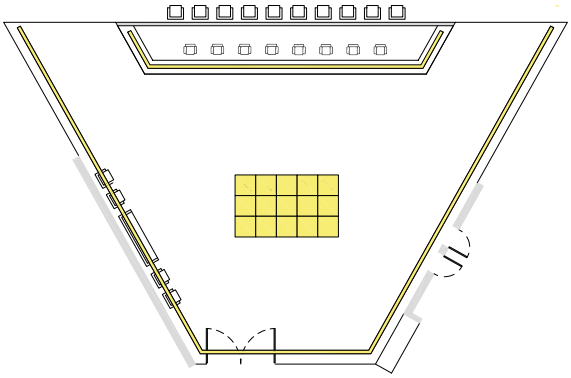


All calculations are based on an annual increase in energy and operating costs of 5 %.

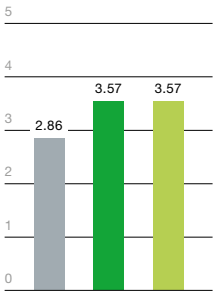
Entrance area | reception before



Entrance area | reception after

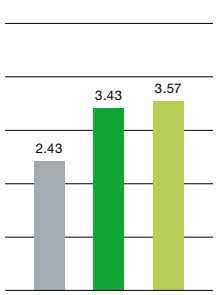


Visual performance



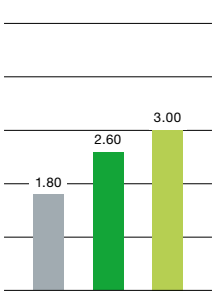
Improved visual performance with LED: LED lighting prevents distracting direct glare, reflections and reflected glare.

Visual comfort



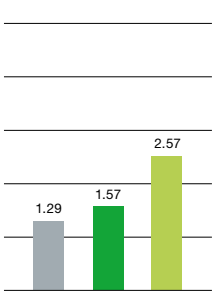
Improved visual comfort with LED: the ceiling and walls are pleasantly bright. Light does not flicker or scintillate.

Vitality



Improved vitality with LED: the lighting creates a natural, pleasant effect.

Flexibility



More flexibility with LED: various lighting scenes can be called up using LED + lighting management.

Standard-compliant design notes
Area of visual task or activity (values in accordance with DIN EN 12464-1)

Reception/sales counters, porters' desks:

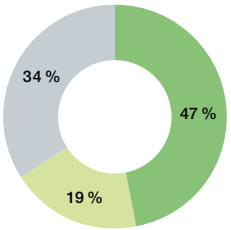
ĒmLux (illuminance):	300
UGRL (glare):	22
UO (uniformity):	0.4
Ra (colour rendering):	80

Lobby:

ĒmLux (illuminance):	100
UGRL (glare):	22
UO (uniformity):	0.4
Ra (colour rendering):	80

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

x

Corridor comparison example

SLOTLIGHT II LED, light line
PURESIGN 150, LED emergency lighting
RESCLITE, LED anti-panic lighting

SLOTLIGHT II
LED light line

PURESIGN 150
LED emergency lighting

RESCLITE
LED anti-panic lighting

Corridors are not just functional areas, they are also places where people work, meet and linger. SLOTLIGHT LED light lines not only blend in subtly to provide guidance and orientation, but because they are fitted with LED lamps, they are extremely efficient compared with existing solutions that use fluorescent lamps. Lighting management in particular, when combined with an LED lighting solution, is the last word in convenience and economic efficiency. Its corridor function makes it possible to operate luminaires at reduced dimming levels when there are no people in corridors. As soon as the presence of a person is detected, the lighting level is automatically adjusted to the required values – immediately, without any delay. Emergency and safety lighting (RESCLITE Escape) are also important in corridors. They ensure orientation and safety, contribute to the sense of well-being of patients, visitors and employees and also meet requisite facility management requirements. Zumtobel has analysed the cost-effectiveness of SLOTLIGHT LED luminaires in corridors compared with a conventional solution in cooperation with the Office of Structural Engineering of the City of Zurich and has produced the “Werd” study. This study can be downloaded free of charge from: **zumtobel.com/office**

Underlying conditions

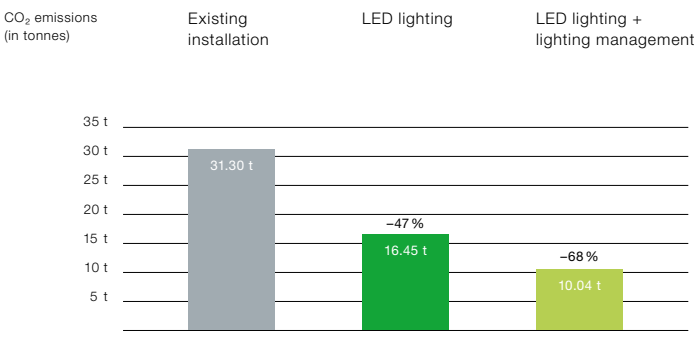
Luminaires before
11 diffuser luminaires, 2 x 36 W T26
Luminous flux of luminaires: 3772 lm
Luminous efficiency of luminaires: 43 lm/W

Luminaires after
19 SLOTLIGHT II LED light lines 24 W
Luminous flux of luminaires: 1716 lm
Luminous efficiency of luminaires: 65 lm/W
2 PURESIGN 150 LED 4.5 W (45 lm / 10 lm/W)
1 RESCLITE escape LED 4.8 W (261 lm / 54 lm/W)

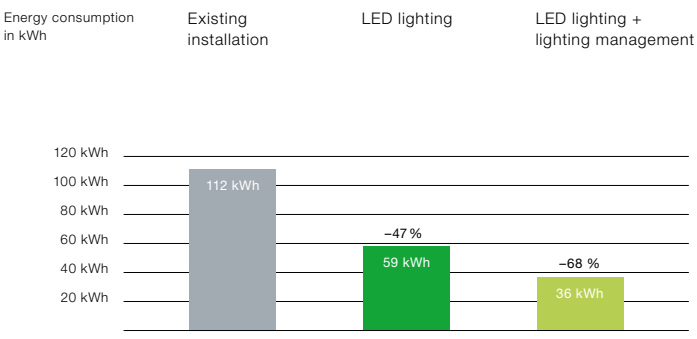
Lighting management
DIMLITE single with corridor function and 3 separate presence detectors

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

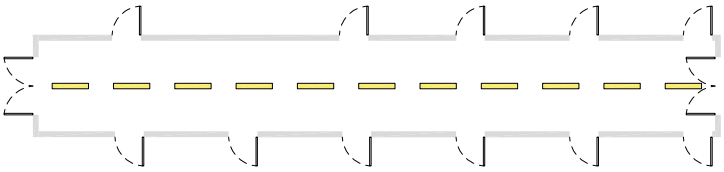


Average energy consumption per m² and year

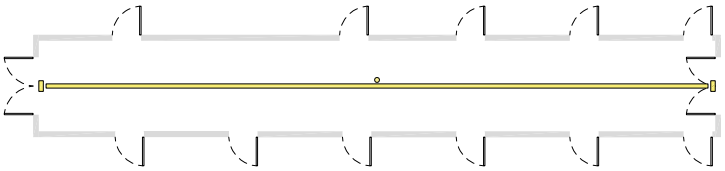


All calculations are based on an annual increase in energy and operating costs of 5 %.

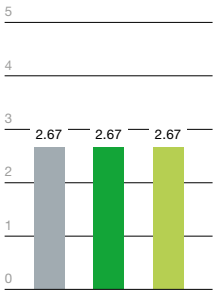
Corridor before



Corridor after

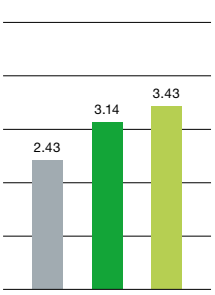


Visual performance



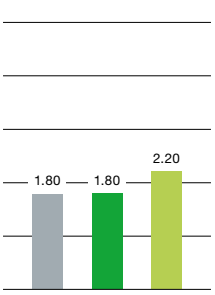
In the corridor, the visual performance of the three lighting solutions is identical because lighting in conformity with relevant standards is decisive for ensuring that the visual task can be identified.

Visual comfort



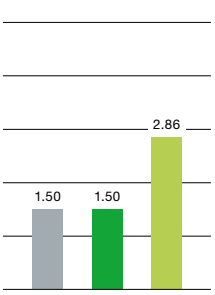
Improved visual comfort with LED: LED light does not flicker or scintillate and the space is uniformly bright.

Vitality



Improved vitality with LED: LED + lighting management adjust the lighting to produce the desired brightness level and can have a positive impact on human biorhythms.

Flexibility



More flexibility with LED: LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs.

Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

Corridor (daytime):

ĒmLux (illuminance):	200
UGRL (glare):	22
UO (uniformity):	0.4
Ra (colour rendering):	80

Corridor (night-time):

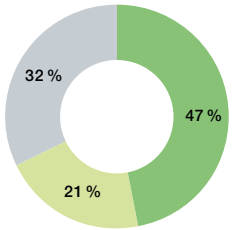
ĒmLux (illuminance):	50
UGRL (glare):	22
UO (uniformity):	0.4
Ra (colour rendering):	80

Multipurpose corridors:

ĒmLux (illuminance):	200
UGRL (glare):	22
UO (uniformity):	0.6
Ra (colour rendering):	80

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC zumtobel.com/ecocalc

Cafeteria comparison example
ONDARIA LED, pendant luminaire

ONDARIA medium Ø 640
Opal LED circular luminaire

ONDARIA small Ø 440
Opal LED circular luminaire

The cafeteria is one of the most important oases of well-being and a communication area for patients, visitors and staff. It must have a perceptible home-like atmosphere. Circular ONDARIA pendant luminaires used in a manner that is in keeping with the facility and supplements its general lighting cater for this need. Compared with pinpoint downlights that are often envisaged, the diffusely distributed light provided by ONDARIA luminaires produces a soft, agreeable effect and prevents excessive shadow detail. Intelligently integrating daylight plays a key role in fostering a sense of well-being and encouraging relaxation. What is more, daylight-based control using DIMLITE daylight provides huge scope for potential energy savings.

Underlying conditions

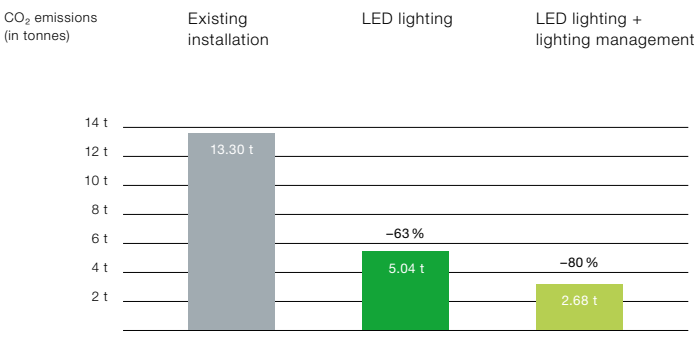
Luminaires before
21 downlights 2 x 26 W TC-D
Luminous flux of luminaires: 1829 lm
Luminous efficiency of luminaires: 30 lm/W

Luminaires after
9 ONDARIA LED Ø 440, 29 W
Luminous flux of luminaires: 2230 lm
Luminous efficiency of luminaires: 73,4 lm/W
4 ONDARIA LED Ø 640, 58.9 W (5241 lm / 89 lm/W)

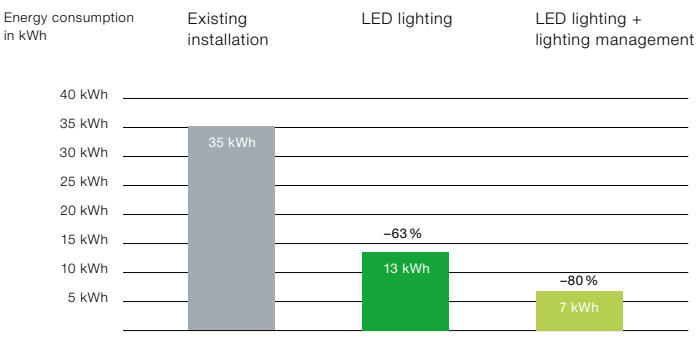
Lighting management
DIMLITE daylight multifunction 2-ch
Scene control units

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

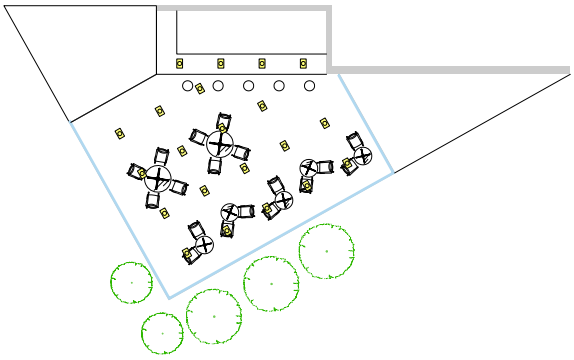


Average energy consumption per m² and year

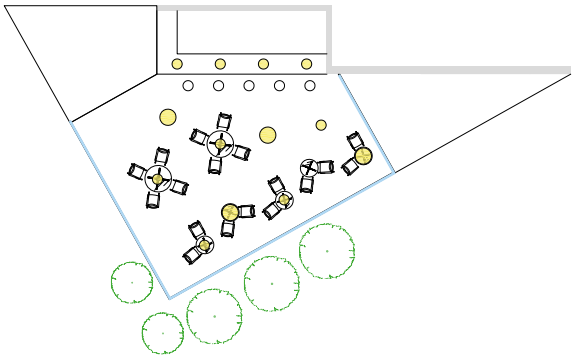


All calculations are based on an annual increase in energy and operating costs of 5 %.

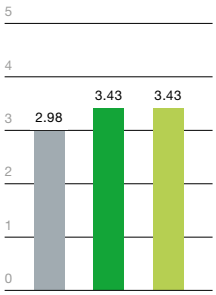
Cafeteria before



Cafeteria after

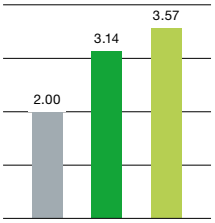


Visual performance



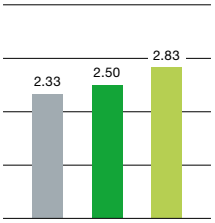
Improved visual performance with LED: LED lighting prevents distracting direct glare, reflections and reflected glare.

Visual comfort



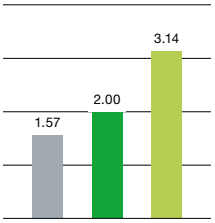
Improved visual comfort with LED: LED light neither flickers nor scintillates. The lighting solution makes use of available daylight through lighting management.

Vitality



Improved vitality with LED: the lighting creates a natural, pleasant effect. LED + lighting management adjust the lighting to the desired brightness level.

Flexibility



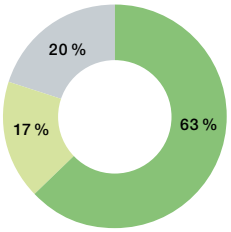
More flexibility with LED: luminaires and switches can be rearranged flexibly. LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs.

Standard-compliant design notes
Area of visual task or activity (values in accordance with DIN EN 12464-1)

Restaurants, dining halls, functional area:	
ĒmLux (illuminance):	–
UGRL (glare):	–
UO (uniformity):	–
Ra (colour rendering):	80
Self-service restaurant:	
ĒmLux (illuminance):	200
UGRL (glare):	22
UO (uniformity):	0.4
Ra (colour rendering):	80
Buffets:	
ĒmLux (illuminance):	300
UGRL (glare):	22
UO (uniformity):	0.6
Ra (colour rendering):	80

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC zumtobel.com/ecocalc

Waiting area comparison example

PERLUCE LED, square ceiling-mounted luminaire
APHRODITE LED, spotlight for special lighting effects

PERLUCE square
Ceiling-mounted LED luminaire

APHRODITE
LED spotlight for special lighting effects

A lighting solution that is coordinated with the architecture of a waiting room helps counteract undesirable feelings such as insecurity, anxiety and impatience. These stress factors are often exacerbated by the lack of daylight in waiting areas which are frequently situated deep inside the building. PERLUCE LED ceiling-mounted luminaires deliver light that is reminiscent the diffuse daylight provided by skylights. Unlike downlights with compact fluorescent lamps, these large-area LED luminaires reduce sharp shadow detail and cut expenditure on maintenance and energy consumption. In addition, DIMLITE lighting management ensures that the LEDs reach their maximum luminous flux immediately as soon as the presence of a person is detected. This provides significantly improved comfort compared with familiar solutions that use compact fluorescent lamps. APHRODITE spotlights avoid static, boring waiting situations by creating calming lighting effects on walls. These lively light patterns ensure that waiting is pleasant and help those who are waiting to relax.

Underlying conditions

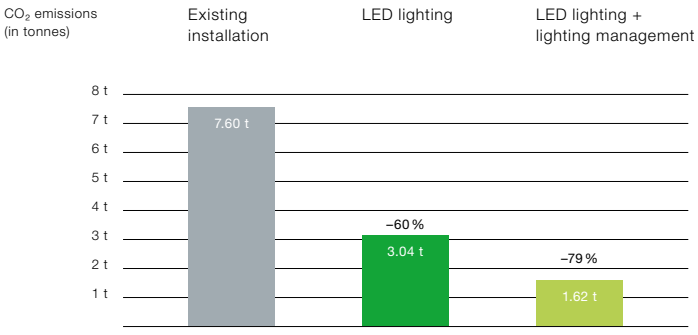
Luminaires before
12 downlights 2 x 26 W TC-D
Luminous flux of luminaires: 1829 lm
Luminous efficiency of luminaires: 30 lm/W

Luminaires after
6 PERLUCE LED 50 W
Luminous flux of luminaires: 5005 lm
Luminous efficiency of luminaires: 100 lm/W
2 APHRODITE LED 40 W

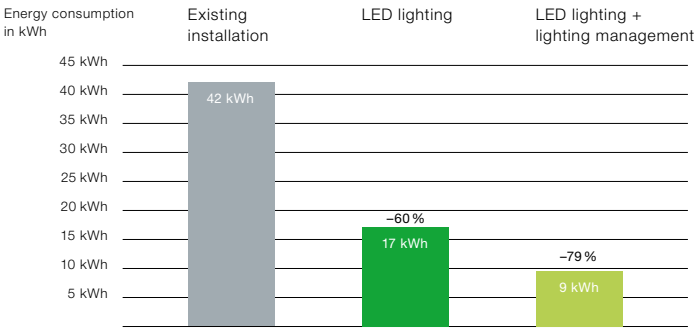
Lighting management
DIMLITE Multifunctional, 4-ch, with presence-based management

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

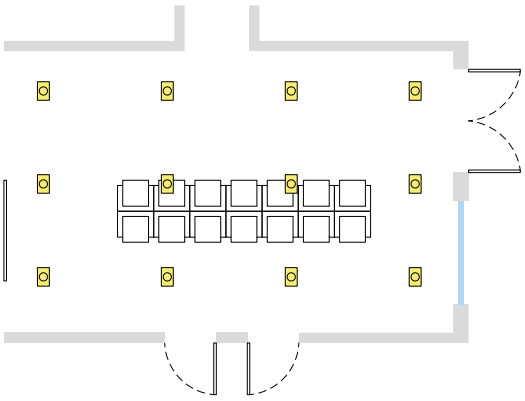


Average energy consumption per m² and year

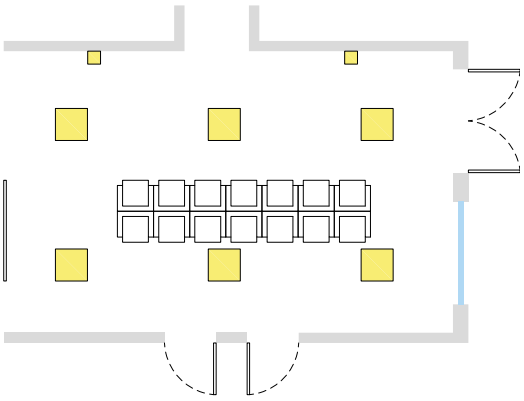


All calculations are based on an annual increase in energy and operating costs of 5 %.

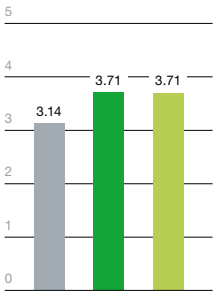
Waiting area before



Waiting area after

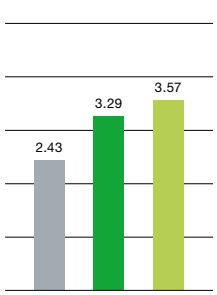


Visual performance



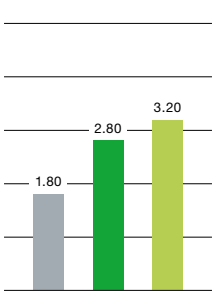
Improved visual performance with LED: the layout and adjustment of the lighting prevent distracting hard shadows and glare.

Visual comfort



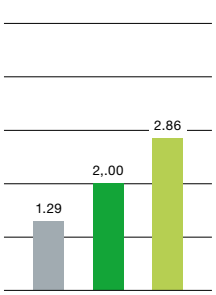
Improved visual comfort with LED: LED light neither flickers nor scintillates. The room seems more pleasant, brighter, especially the ceiling area.

Vitality



Improved vitality with LED: the lighting creates a natural, pleasant effect. The stimulating effect of the coloured special lighting effects promotes a sense of well-being.

Flexibility



More flexibility with LED: various lighting scenes can be called up using LED + lighting management. Sensors and control systems help users adjust the lighting situation to suit their personal needs.

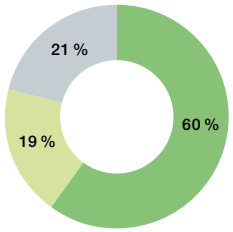
Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

Waiting rooms:

ĒmLux (illuminance):	200
UGRL (glare):	22
UO (uniformity):	0.4
Ra (colour rendering):	80

Remaining
energy consumption

Additional savings using
lighting management



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Examination room comparison example
LIGHT FIELDS evolution, recessed LED luminaire

LIGHT FIELDS evolution
Recessed LED luminaire

A lighting solution that can be conveniently adjusted to suit various work situations is a basic prerequisite for examination rooms. LIGHT FIELDS evolution recessed LED luminaires meet both ergonomic and design requirements with equal ease. The lighting level can be increased at the push of a button and can be supplemented by flexible examination lights when carrying out special examinations. Communication between doctor and patient is encouraged by reduced, private room lighting. Luminaires fitted with LEDs are almost totally maintenance-free and ensure that space can be used flexibly. The downward-sealed LIGHT FIELDS recessed luminaire copes with hygiene and cleaning requirements better than louvre luminaires. The extremely high light output of the LED luminaire, luminaire grouping and daylight monitoring guarantee an enormous energy saving. The expansive glowing surfaces of LIGHT FIELDS evolution provide a friendly, stimulating room atmosphere with reduced shadow detail which contrasts sharply with the dark ceiling look produced by the glare limitation of louvre luminaires.

Underlying conditions

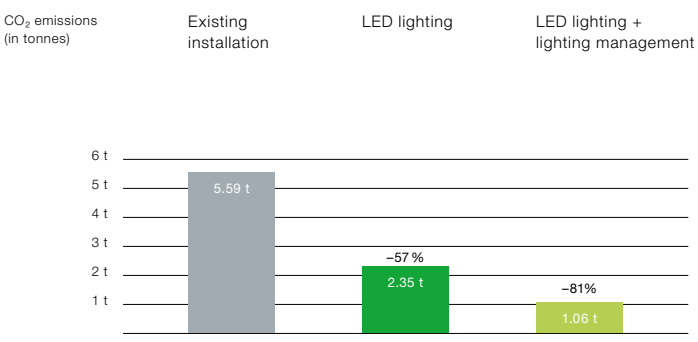
Luminaires before
6 louvre luminaires 4 x 18 W T26
Luminous flux of luminaires: 3024 lm
Luminous efficiency of luminaires: 34 lm/W

Luminaires after
6 LIGHT FIELDS LED evolution 36 W
Luminous flux of luminaires: 3700 lm
Luminous efficiency of luminaires: 100 lm/W

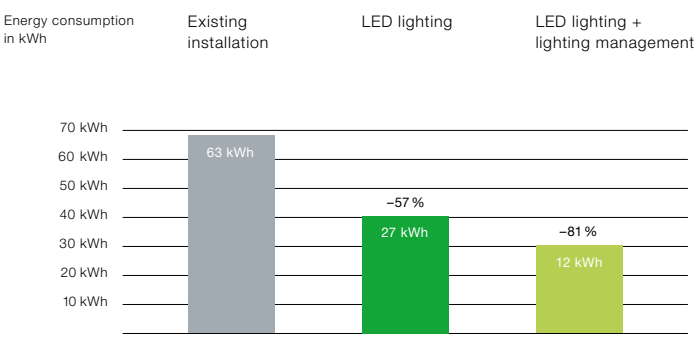
Lighting management
DIMLITE daylight daylight-based lighting management
+ manual operation of 2 luminaire groups

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

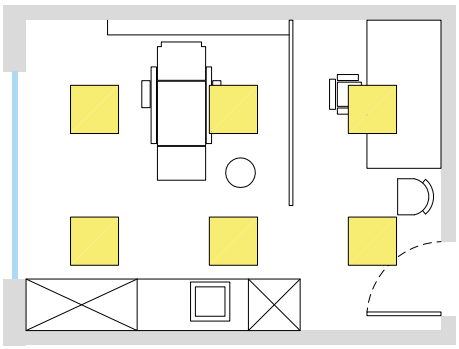


Average energy consumption per m² and year

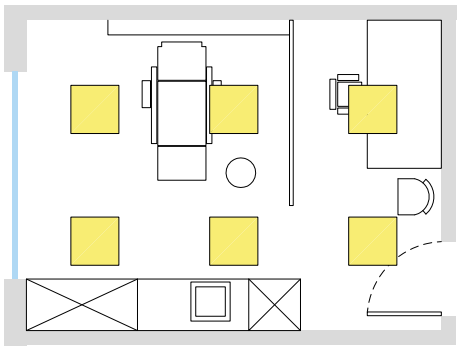


All calculations are based on an annual increase in energy and operating costs of 5 %.

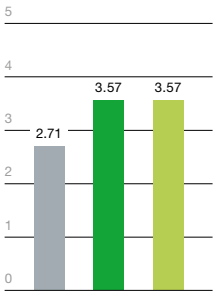
Examination room before



Examination room after

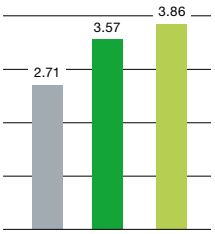


Visual performance



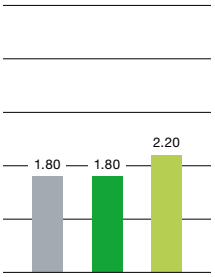
Improved visual performance with LED: LED lighting prevents distracting direct glare, reflections and reflected glare.

Visual comfort



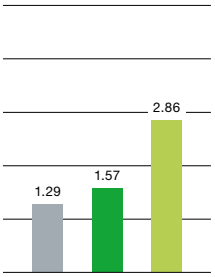
Improved visual comfort with LED: LED light neither flickers nor scintillates. The lighting solution makes use of available daylight through lighting management.

Vitality



Improved vitality with LED: LED + lighting management adjust the lighting to the desired brightness level.

Flexibility



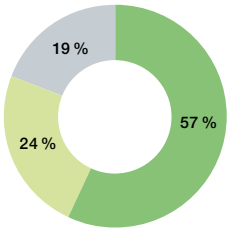
More flexibility with LED: LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs.

Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

General lighting:	
Ēm**Lux** (illuminance):	500
UGRL (glare):	19
U0 (uniformity):	0.4
Ra (colour rendering):	90
Examination/treatment:	
Ēm**Lux** (illuminance):	1000
UGRL (glare):	19
U0 (uniformity):	0.4
Ra (colour rendering):	90
Surgical dressing rooms:	
Ēm**Lux** (illuminance):	500
UGRL (glare):	19
U0 (uniformity):	0.4
Ra (colour rendering):	80

Remaining **energy consumption**

Additional savings using **lighting management**



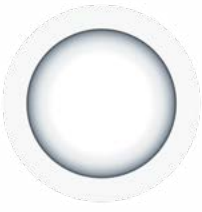
Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC zumtobel.com/ecocalc

Surgery hallway comparison example
PANOS infinity, LED downlight



PANOS infinity
LED downlight

Compared with corridors in nursing areas, surgery hallways must be subjected to a more precise energy analysis because higher lighting levels are required in these areas due to their more exacting spatial and visual requirements. In this refurbishment example, downlights using compact fluorescent lamps are replaced by extremely efficient PANOS infinity LED downlights on a one-for-one basis. Visual comfort is optimised, in particular by the corridor function which switches the lighting on and off because the maximum luminous flux is reached immediately with no delay as soon as a person is present. The corridor function ensures a minimum level of light for convenience and safety reasons even when no one is present, so nobody ever has to enter a completely dark room. In contrast to conventional solutions, frequent switching and dimming do not cause LEDs to wear out.

Underlying conditions

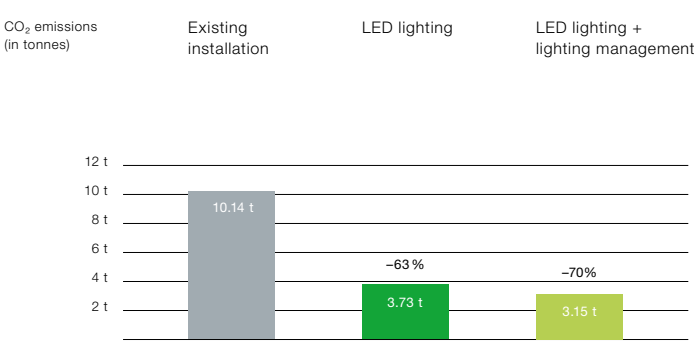
Luminaires before
16 downlights 2 x 26 W TC-D
Luminous flux of luminaires: 2022 lm
Luminous efficiency of luminaires: 32.4 lm/W

Luminaires after
16 PANOS infinity LED RA 90 23 W
Luminous flux of luminaires: 1860 lm
Luminous efficiency of luminaires: 81 lm/W

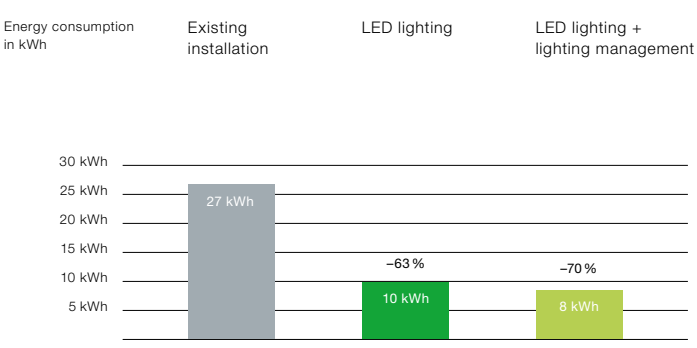
Lighting management
DIMLITE single with corridor function and 3 separate presence detectors

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

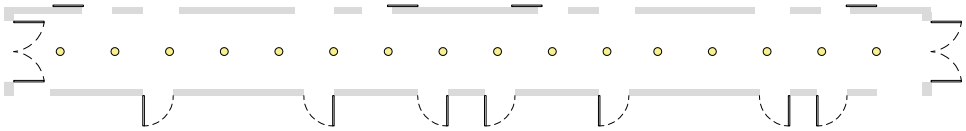


Average energy consumption per m² and year

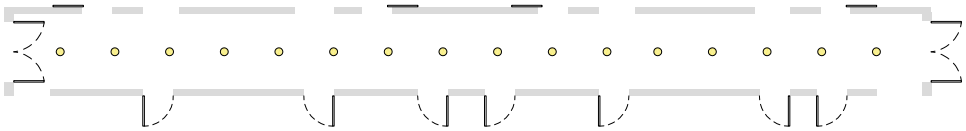


All calculations are based on an annual increase in energy and operating costs of 5 %.

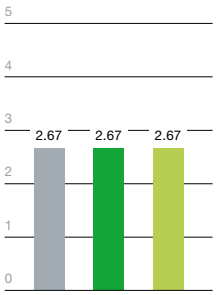
Surgery hallway before



Surgery hallway after

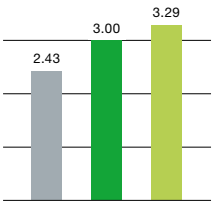


Visual performance



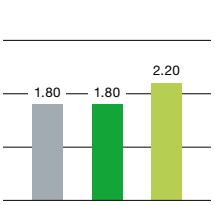
In the corridor, the visual performance of the three lighting solutions is identical because lighting in conformity with relevant standards is decisive for ensuring that the visual task can be identified.

Visual comfort



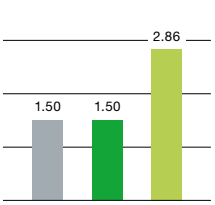
Improved visual comfort with LED: LED light does not flicker or scintillate and the space is uniformly bright.

Vitality



Improved vitality with LED: LED + lighting management adjust the lighting to produce the desired brightness level and can have a positive impact on human biorhythms.

Flexibility



More flexibility with LED: LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs.

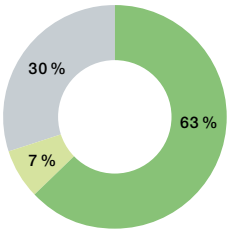
Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

Corridors in operating areas:

ĒmLux (illuminance):	300
UGRL (glare):	19
UO (uniformity):	0.6
Ra (colour rendering):	80

Remaining
energy consumption

Additional savings using
lighting management



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Pre-op room comparison example
CLEAN advanced LED, cleanroom luminaire

CLEAN advanced
LED cleanroom luminaire

In surgical pre-op rooms, the paramount concern is protecting patients against germs and the demanding cleaning requirements that this brings in its wake. The CLEAN advanced LED cleanroom luminaire offers maximum safety and optimum chemical resistance thanks to its high degree of protection (IP65) and cleanroom compatibility which has been certified by the Fraunhofer Institute. Its microprismatic-optic-based lighting technology guarantees glare control, even when mounted in a horizontal position, and great efficiency thanks to its optimised direction of light. The luminaire's light output is twice that of conventional lighting solutions thanks to the innovative way in which it generates light by using LEDs. DIMLITE lighting management with presence detection leverages this luminaire's integral lighting concept. Disruption of critical surgical procedures due to maintenance work such as relamping is now history thanks to the long service life of this LED luminaire.

Underlying conditions

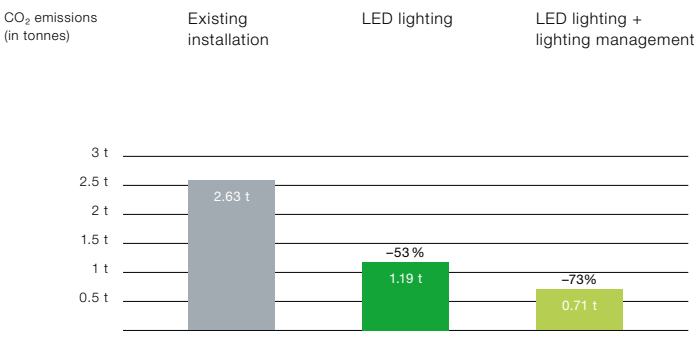
Luminaires before
2 cleanroom luminaires 3 x 36 W T26
Luminous flux of luminaires: 5404 lm
Luminous efficiency of luminaires: 42 lm/W

Luminaires after
2 CLEAN advanced LED 59 W
Luminous flux of luminaires: 5240 lm
Luminous efficiency of luminaires: 89 lm/W

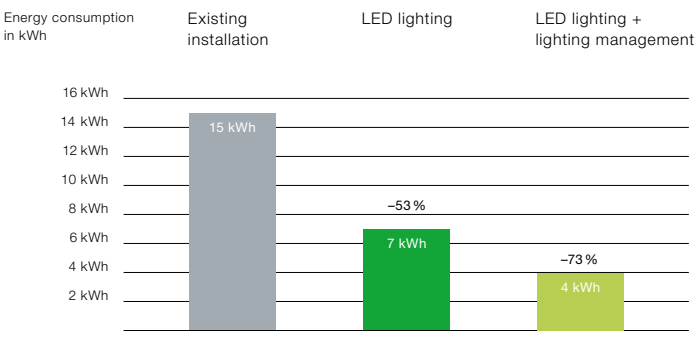
Lighting management
DIMLITE single with present detector and manual switch-on/off

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

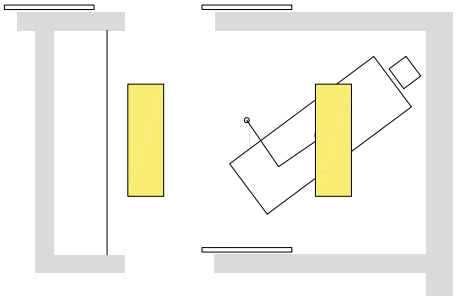


Average energy consumption per m² and year

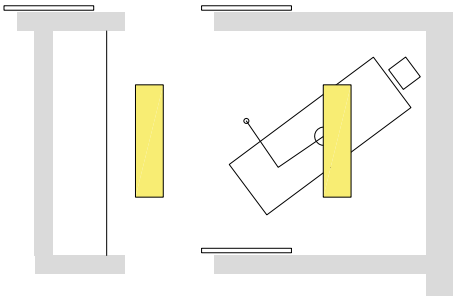


All calculations are based on an annual increase in energy and operating costs of 5 %.

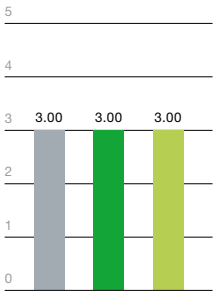
Pre-op room before



Pre-op room after

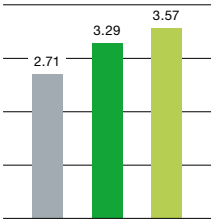


Visual performance



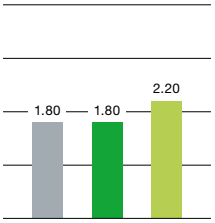
In the pre-op room, the visual performance of the three lighting solutions is identical because lighting in conformity with relevant standards is decisive for ensuring that the visual task can be identified.

Visual comfort



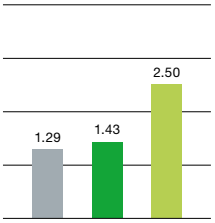
Improved visual comfort with LED: LED light does not flicker or scintillate and the space is uniformly bright.

Vitality



Improved vitality with LED: LED + lighting management adjust the lighting to the desired brightness level.

Flexibility



More flexibility with LED: LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs.

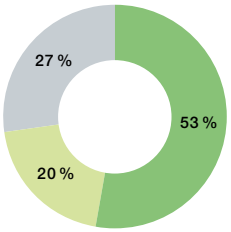
Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

Pre-op rooms and post-op recovery rooms:

ĒmLux (illuminance):	500
UGRL (glare):	19
UO (uniformity):	0.6
Ra (colour rendering):	90

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Operating theatre comparison example

CLEAN supreme, surface-mounted luminaire with mounting frame

CLEAN supreme T16
surface-mounted luminaires with
mounting frame

Clean rooms are built to meet exceptional requirements and expectations. They are very often used to perform demanding visual tasks. This is why great importance is attached to cleanroom lighting. Surgery, for instance, makes extremely heavy demands on doctors and medical staff, especially as far as visual performance is concerned. Good lighting makes sure that important details are perceived reliably and quickly. The CLEAN supreme luminaire with its highly specular optic is the answer to the constantly growing number of visual display terminals encountered in clean rooms because it eliminates distracting reflections and meets the relevant standards. With T16 (T5) lamp technology and electronic ballast, this luminaire is highly efficient, not only in terms of its light output. The luminaire has IP65 protection and is Fraunhofer IPA-certified for cleanroom compatibility in rooms of ISO classes 3 to 9. For better lighting control and lighting scene selection, there is the DIMLITE lighting management system with presence detection which can deliver even greater energy savings and reductions in CO_2 emissions.

Underlying conditions

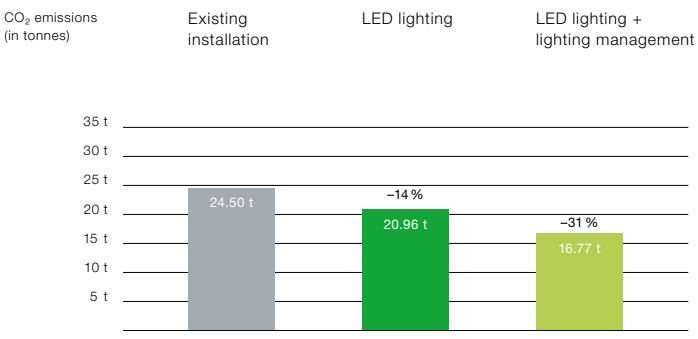
Luminaires before
12 cleanroom luminaires 3 x 58 W T26
Luminous flux of luminaires: 8061 lm
Luminous efficiency of luminaires: 40 lm/W

Luminaires after
12 CLEAN supreme, surface-mounted luminaires with mounting frame 3 x 54 W T16
Luminous flux of luminaires: 9198 lm
Luminous efficiency of luminaires: 53 lm/W

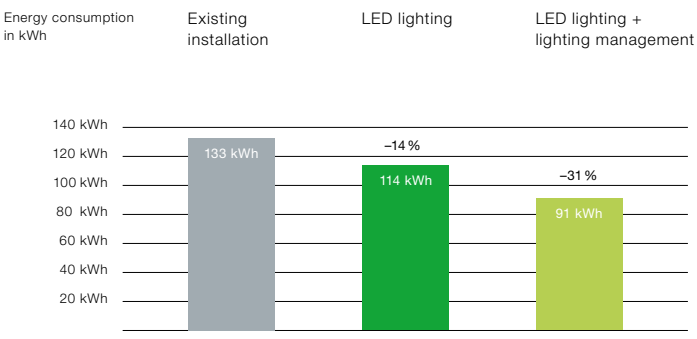
Lighting management
DIMLITE 4-ch multifunctional control unit with control system and presence detection.

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

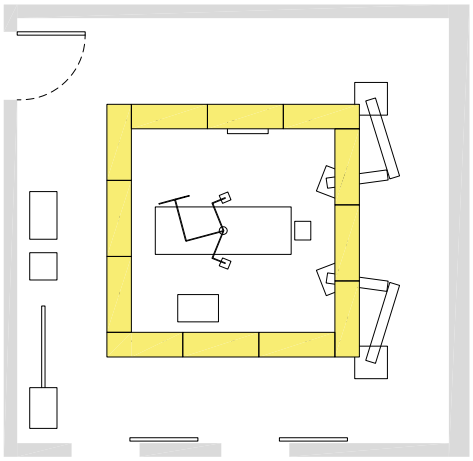


Average energy consumption per m² and year

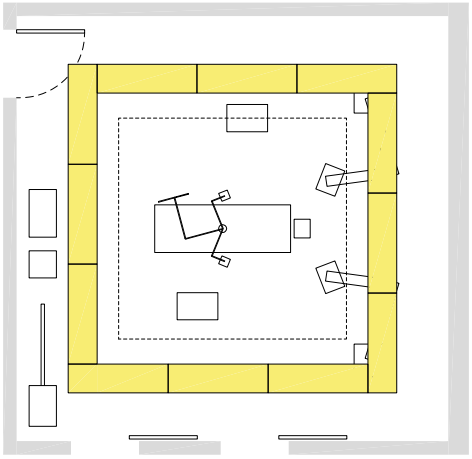


All calculations are based on an annual increase in energy and operating costs of 5 %.

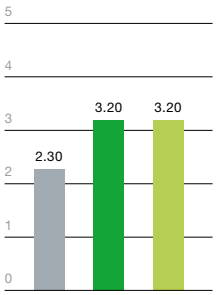
Operating theatre before



Operating theatre after

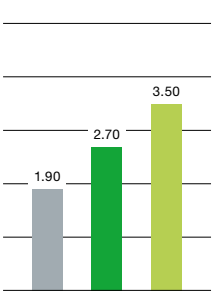


Visual performance



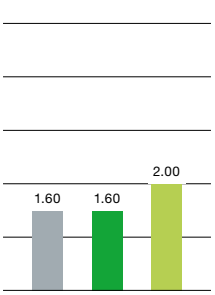
Better visual performance: for improved recognisability in connection with visual tasks and activities, the T16 solution outperforms applicable standards.

Visual comfort



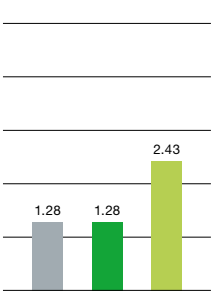
Better visual comfort: the room is pleasantly bright.

Vitality



Better vitality: with lighting management the lighting adjusts itself to the desired brightness level.

Flexibility

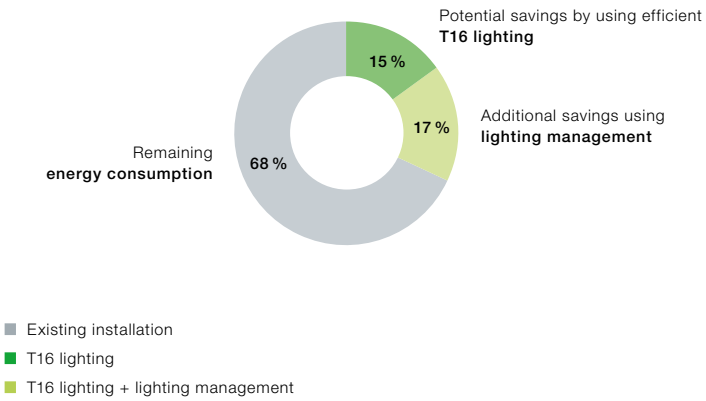


More flexibility with lighting management: it allows users to adjust the lighting situation to suit their personal needs.

Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

Operating theatres
Writing, reading, data processing:

ĒmLux (illuminance):	1000
UGRL (glare):	19
UO (uniformity):	0.6
Ra (colour rendering):	90



ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Two-bed room comparison example

SINUS LED, medical supply unit
FD 1000 LED, downlight

SINUS
LED medical supply unit

FD 1000
LED downlight

The SINUS medical supply unit is a lighting and supply tool that offers maximum flexibility in addition to a clear stylistic idiom, thanks to LED technology. In this way, the lighting adjusts to different states of occupancy by means of a selector switch – for instance, turning an efficiently illuminated single or 2-bed room into an optimally supplied and illuminated 3-bed room if required. Perfect light in patient rooms facilitates nursing and examinations, but also aids recovery.
The SINUS supply unit boasts diversity, providing indirect general lighting for an open, stimulating room ambience, individual reading and examination lighting through to night lighting.
Facility management is taken into account thanks to excellent efficiency. The efficiency of the LED solution at the bedside in combination with LED downlights for room lighting can be optimised even further through presence detectors and daylight sensors. Even sockets, switches, emergency call and outlets for medical gases have been implemented within the scope of this system solution.

Underlying conditions

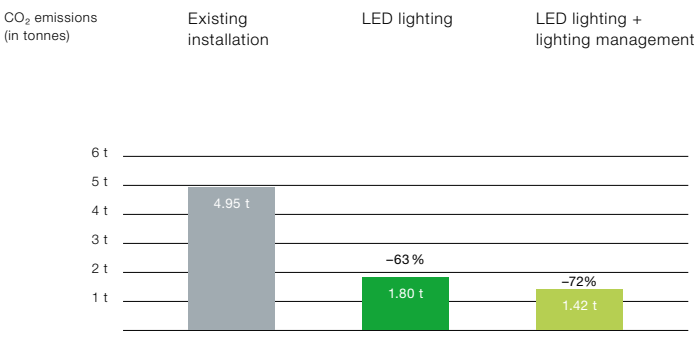
Luminaires before
2 room lights 2 x 58 W T26
Luminous flux of luminaires: 6181 lm
Luminous efficiency of luminaires: 44 lm/W
2 reading lights 1 x 36 W TC-L (1350 lm / 43.5 lm/W)
1 night light 1 x 5.4 W TC (250 lm / 46 lm/W)
2 downlights 2 x 18 W TC-D (1224 lm / 32 lm/W)

Luminaires after
2 room lights SINUS LED 57 W
Luminous flux of luminaires: 5480 lm
Luminous efficiency of luminaires: 96 lm/W
2 reading lights SINUS LED: 12 W (860 lm / 72 lm/W)
1 night light LED 1.2 W (51 lm / 42.5 lm/W)
2 FD 1000 LED 14 W (1045 lm / 75 lm/W)

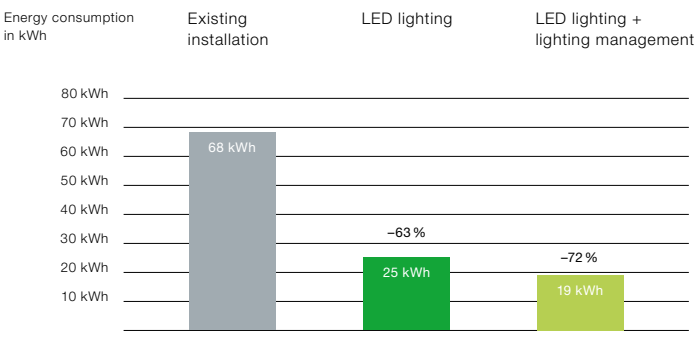
Lighting management
DIMLITE 2-ch multifunctional control unit with daylight-based and presence-based control
Circle KIT control point

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

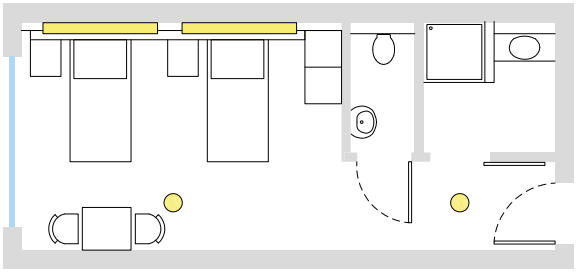


Average energy consumption per m² and year

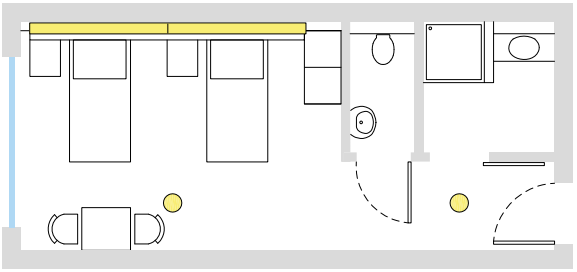


All calculations are based on an annual increase in energy and operating costs of 5 %.

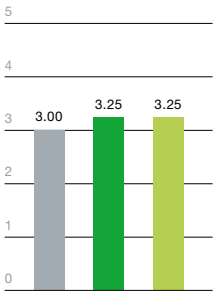
Standard patient room before



Standard patient room after

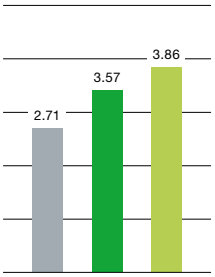


Visual performance



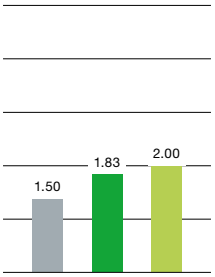
Improved visual performance with LED: for improved recognisability in connection with visual tasks and activities, the LED solution outperforms applicable standards.

Visual comfort



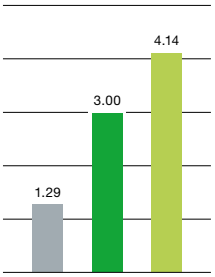
Improved visual comfort with LED: LED light neither flickers nor scintillates. The lighting solution makes use of available daylight through lighting management.

Vitality



Improved vitality with LED: LED + lighting management adjust the lighting to the desired brightness level.

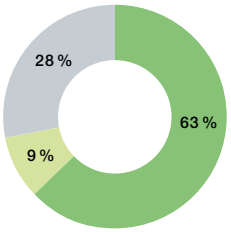
Flexibility



More flexibility with LED: LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs. A variety of lighting scenes can be called up.

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

General lighting:
ĒmLux (illuminance): 100
UGRL (glare): 19
UO (uniformity): 0.4
Ra (colour rendering): 80

Reading light:
ĒmLux (illuminance): 300
UGRL (glare): 19
UO (uniformity): 0.7
Ra (colour rendering): 80

Mere examination:
ĒmLux (illuminance): 300
UGRL (glare): 19
UO (uniformity): 0.6
Ra (colour rendering): 80

Examination and treatment:
ĒmLux (illuminance): 1000
UGRL (glare): 19
UO (uniformity): 0.7
Ra (colour rendering): 90

Night light:
ĒmLux (illuminance): 5
Ra (colour rendering): 80

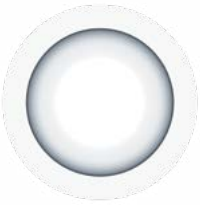
Bathrooms and toilets for patients:
ĒmLux (illuminance): 200
UGRL (glare): 22
UO (uniformity): 0.4
Ra (colour rendering): 80

ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Single-bed room comparison example

IMWS, integrated wall-mounted medical system
PANOS infinity Tunable White, LED downlight



PANOS infinity Tunable White
LED downlight

IMWS
Integrated wall-mounted medical system

Bringing a home-like feel to a patient room enhances the patient's emotional and physical well-being and thus aids convalescence. Equipment determines the effect a room has and its ambience to a large degree. The IMWS LED wall-mounted medical system fulfils design requirements thanks to its modular design and meets photometric requirements with equal ease. The flush-fitting room and reading light makes cleaning easier. Another positive benefit of its modular design, which encompasses the supply of both power and gas, is easy and quick installation because there is no longer any need to ensure coordination between different building services. PANOS infinity LED downlights with Tunable White make it possible to bring a room alive by dynamically using varying illuminance levels and light colours. Thus, a reddish or bluish room ambience can be created, depending on the time of day, weather or visual task to be tackled. The DIMLITE lighting management system with daylight-based and presence-based control works away in the background to achieve this and also delivers added value by saving energy.

Underlying conditions

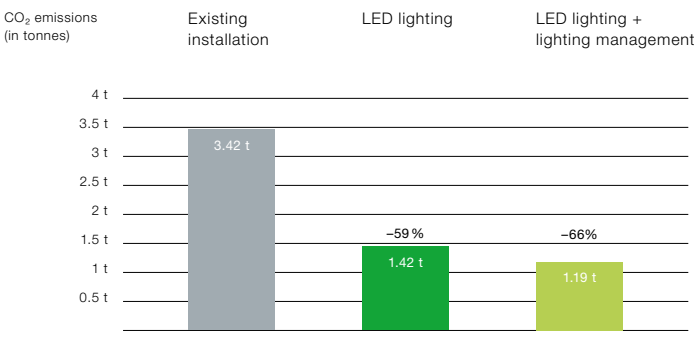
Luminaires before
1 room light 2 x 58 W T26
Luminous flux of luminaires: 6181 lm
Luminous efficiency of luminaires: 44 lm/W
1 reading light 1 x 36 W TC-L (1350 lm / 43,5 lm/W)
3 downlights 2 x 18 W TC-D (1224 lm / 32 lm/W)

Luminaires after
1 room light IMWS LED: 71 W
Luminous flux of luminaires: 6200 lm
Luminous efficiency of luminaires: 88 lm/W
1 reading light IMWS LED: 16 W
Luminous flux of luminaires: 1190 lm
Luminous efficiency of luminaires: 74 lm/W
2 PANOS infinity LED Tunable White 22 W
Luminous flux of luminaires: 1025 lm
Luminous efficiency of luminaires: 47 lm/W

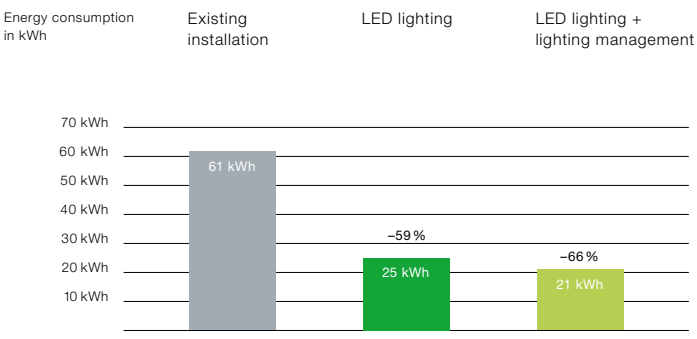
Lighting management
DIMLITE 4-ch multifunctional control unit with daylight-based and presence-based control
Circle KIT control point

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

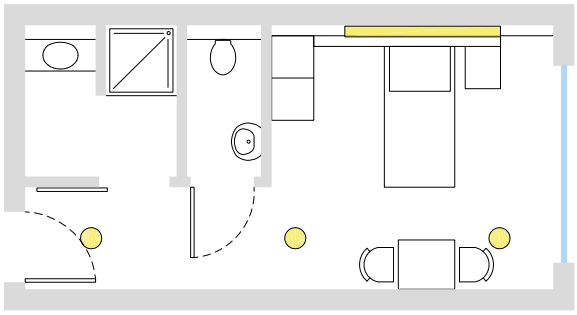


Average energy consumption per m² and year

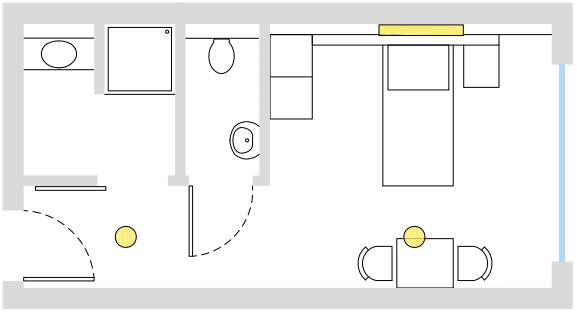


All calculations are based on an annual increase in energy and operating costs of 5 %.

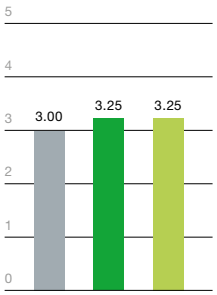
Superior patient room before



Superior patient room after

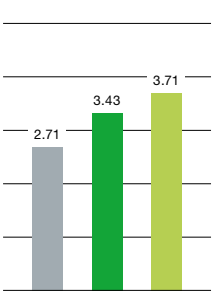


Visual performance



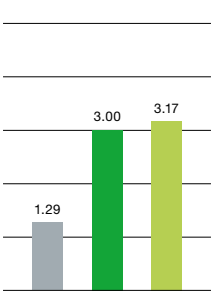
Improved visual performance with LED: for improved recognisability in connection with visual tasks and activities, the LED solution outperforms applicable standards.

Visual comfort



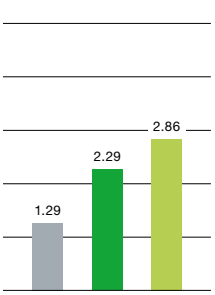
Improved visual comfort with LED: LED light neither flickers nor scintillates. The lighting solution makes use of available daylight through lighting management.

Vitality



Improved vitality with LED: innovative, LED-based Tunable White technology works in harmony with the human circadian body clock.

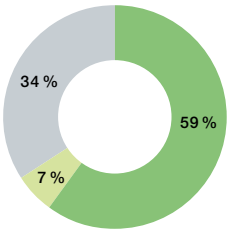
Flexibility



More flexibility with LED: LED + lighting management (sensors and control systems) help users adjust the lighting situation to suit their needs.

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

Standard-compliant design notes
Area of visual task or activity
(values according to DIN EN 12464-1 and DIN 5035-3)

General lighting:
ĒmLux (illuminance): 100
UGRL (glare): 19
UO (uniformity): 0.4
Ra (colour rendering): 80

Reading light:
ĒmLux (illuminance): 300
UGRL (glare): 19
UO (uniformity): 0.7
Ra (colour rendering): 80

Routine examination:
ĒmLux (illuminance): 300
UGRL (glare): 19
UO (uniformity): 0.6
Ra (colour rendering): 80

Examination and treatment:
ĒmLux (illuminance): 1000
UGRL (glare): 19
UO (uniformity): 0.7
Ra (colour rendering): 90

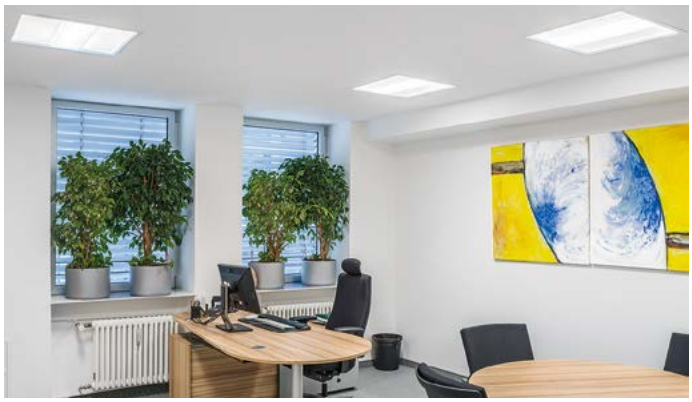
Night light:
ĒmLux (illuminance): 5
Ra (colour rendering): 80

Bathrooms and toilets for patients:
ĒmLux (illuminance): 200
UGRL (glare): 22
UO (uniformity): 0.4
Ra (colour rendering): 80

ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Office comparison example
MELLOW LIGHT V, recessed LED luminaire



MELLOW LIGHT V
Recessed LED luminaire

The MELLOW LIGHT V LED luminaire cannot fail to impress with its friendly, open room ambience. Its mellow light distribution and well-balanced shadow detail spread a sense of well-being among employees, ensure task areas are uniformly lit and provide optimal glare control. Reduced illuminance levels at steep viewing angles allow tools and materials to be positioned flexibly. The perceptible illuminance levels of the light exit surface have a stimulating effect compared with conventional louvre luminaire solutions which produce a gloomy ceiling and room appearance. The interaction of LED luminaires and lighting control with daylight and presence monitoring creates a lighting solution that achieves superb levels of performance in terms of lighting quality and energy efficiency.

Underlying conditions

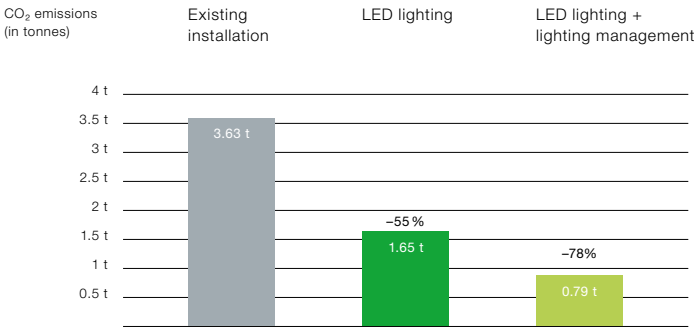
Luminaires before
4 louvre luminaires 4 x 18 W T26
Luminous flux of luminaires: 3472 lm
Luminous efficiency of luminaires: 39.5 lm/W

Luminaires after
4 MELLOW LIGHT V LED 37 W
Luminous flux of luminaires: 4060 lm
Luminous efficiency of luminaires: 101 lm/W

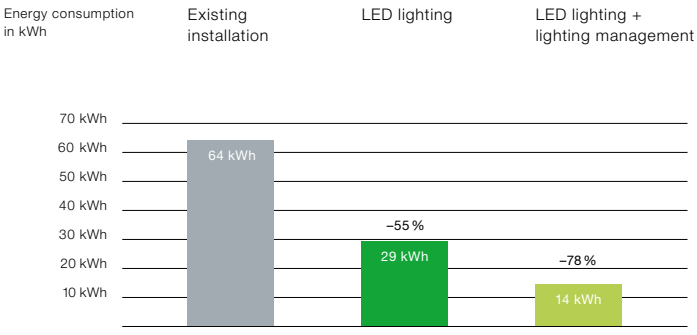
Lighting management
DIMLITE daylight with daylight-based and presence-based control

Calculation period
20 years

CO_2 emissions over life cycle (20 years)

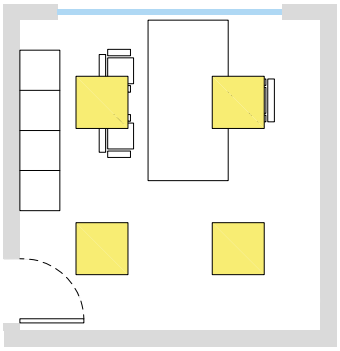


Average energy consumption per m² and year

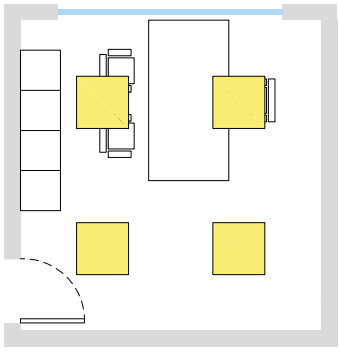


All calculations are based on an annual increase in energy and operating costs of 5 %.

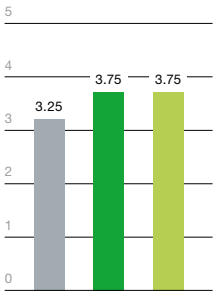
Office before



Office after

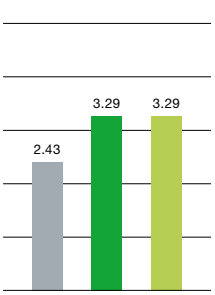


Visual performance



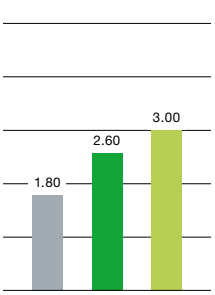
Improved visual performance with LED: optimum illuminance and mellow light distribution without any distracting glare.

Visual comfort



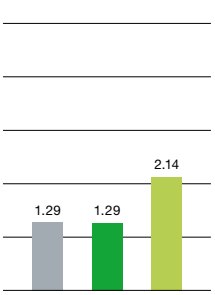
Improved visual comfort with LED: LED light neither flickers nor scintillates. The lighting solution makes use of available daylight through lighting management.

Vitality



Improved vitality with LED: the lighting creates a more natural, pleasant effect and ensures a positive room effect.

Flexibility



More flexibility with LED: various lighting scenes can be called up using LED + lighting management. Sensors and control systems help users adjust the lighting situation to suit their personal needs. This lighting concept makes it possible to individually adjust the spatial concept.

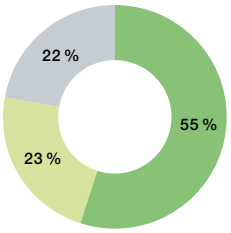
Standard-compliant design notes
Area of visual task or activity (values in accordance with DIN EN 12464-1)

Offices
Writing, reading, data processing:

Ēm Lux (illuminance):	500
UGRL (glare):	19
UO (uniformity):	0.6
Ra (colour rendering):	80

Remaining **energy consumption**

Additional savings using **lighting management**



Potential savings by using efficient **LED lighting** alone

- Existing installation
- LED lighting
- LED lighting + lighting management

ecoCALC

A comparative analysis was carried out using ecoCALC
zumtobel.com/ecocalc

Lighting management
Lighting control for hospitals and care settings

Hospitals and care facilities make huge demands on lighting. Lighting control makes lighting more sensitive to patients' needs. It makes various lighting scenarios available for rapidly-changing work situations and automatically adjusts lighting conditions to suit different times of day. This is becoming more and more important in care settings because patients' requirements in examination rooms differ drastically from those of staff in office premises, corridors and passageways. Zumtobel has the right solution for every situation.

Patients' and care rooms

Offices and administration

Convenient operation
It must be extremely convenient for patients and staff to select a lighting scene, regardless whether they use a momentary-action switch or a remote control to do so. Simple controls make allowance for patients who have restricted abilities. Convenience for building services staff means unrestricted access to the entire system at all times. Lighting scenes can be modified and safety lighting can be inspected at any time.

Dynamic daylight transitions
Lighting that mimics daylight in terms of light colour and intensity makes people feel safer and more at ease. Areas where there is little daylight derive particular benefit from such lighting. When used in combination with variable colour-temperature, dimmable luminaires, LUXMATE lighting control systems create perfect lighting conditions for various types of rooms.

Energy saving
Intelligent automation provides a variety of ways of saving energy: a built-in calendar with adjustable time slots can switch artificial lighting on and off at pre-set times. Combined with presence detectors, this boosts the efficiency of a lighting solution even more. Using a daylight-based LUXMATE lighting control system has the highest energy savings potential: depending on outdoor light conditions, blinds are automatically used for glare control, overheating of buildings is prevented and artificial lighting is automatically dimmed down to defined lighting levels.

Safety
Safety is paramount. This is why Zumtobel offers a unique way of combining general lighting management systems with an emergency lighting system. For instance, LITENET is used to monitor emergency and escape sign luminaires that are powered by an ONLITE central battery system. Building services staff are immediately alerted if a lamp fails or a malfunction occurs.

Foyers and lounges

Treatment and operating areas

Underground car parks and plant rooms

Emergency lighting / escape sign luminaires
Inconspicuous day to day, dependable in emergencies

ONLITE emergency luminaires
RESCLITE emergency luminaires for ceilings and walls

Using a power LED and four sophisticated optics, RESCLITE paves the way to a new era of emergency lighting. Thanks to maximum efficiency and perfect light distribution, a few luminaires are enough to provide emergency lighting in conformity with relevant standards. And yet the powerful RESCLITE LED power package requires a minimum of energy.

RESCLITE escape
Illuminates escape routes at every turn

Maximum luminaire spacing
up to 26 m > 1 lx

RESCLITE antipanic
Ensures good orientation in the room

Maximum room illumination
up to 220 m² > 0.5 lx

RESCLITE spot
Rescue and alarm facilities are shown in the right light

Maximum object illumination
Ø up to 3.8 m > 5 lx

RESCLITE wall
Uses the wall for safe escape route lighting

Maximum luminaire spacing
up to 15 m > 1 lx

ONLITE escape sign luminaires
Superior safety despite unobtrusive design

With ONLITE, Zumtobel offers a comprehensive range of escape sign luminaires in widely diverse sizes and protection types. This enables the right solution for the complete spectrum of applications, building types and building sizes.
Zumtobel is unique in the market in offering a wide diversity of mounting options for the various luminaire ranges: other escape sign luminaires are limited to two or three different types, but Zumtobel luminaires are extremely flexible. PURESIGN 150 for example has up to nine different mounting options – each with all supply variants for single and central batteries.

ONLITE PURESIGN 150
Great lighting technology in a slender design

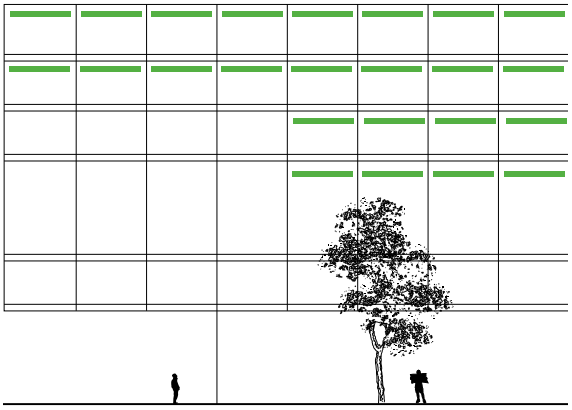
ONLITE COMSIGN 150
The peak of LED technology

ONLITE ARTSIGN
A design sensation in its own right

ONLITE local and ONLITE central
Zumtobel's emergency lighting systems

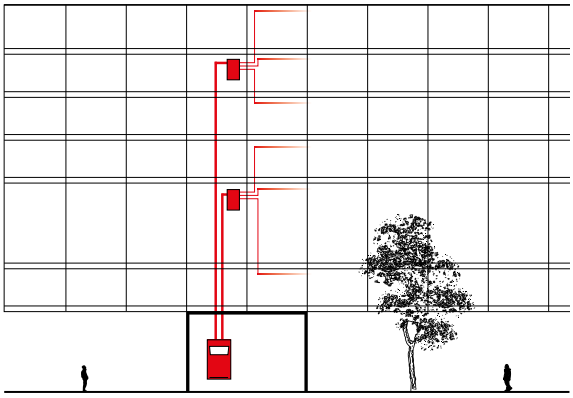
ONLITE local
Self contained emergency lighting system

Self contained emergency lighting systems have one feature in common - the battery fitted into every luminaire. In emergency mode, this supplies the light source with power in order to prevent panic reactions, ensure the workplace is evacuated safely and show the escape route. Economic efficiency and a high level of safety are both factors in favour of a self contained system. This system is the ideal solution for small and medium-sized buildings in particular.



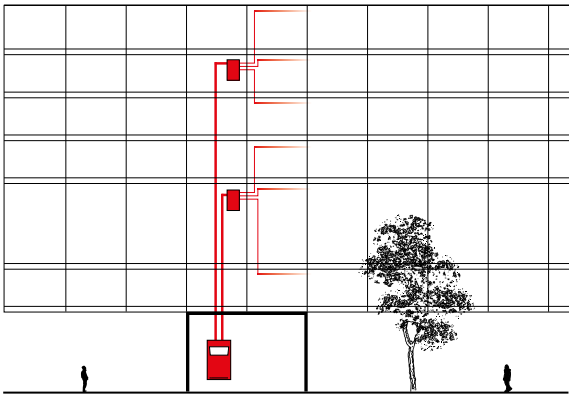
ONLITE central eBox
The new group and central battery system

The ONLITE central eBox works in perfect harmony with Zumtobel LED emergency and escape sign luminaires. Even the use of standard luminaires with mains voltage of 230 V AC or 216 V DC is possible. Thanks to the convenient structure and the modular plug-in technology, the central emergency power supply system can be used very flexibly. Another advantage: convenient handling thanks to straightforward assembly, optional cable entry from above and from below, and a large cable clamp compartment. Initial commissioning via the WIZARD-based menu is also very easy. Combination of various monitoring modes such as DALI, Powerline, circuit monitoring within one system, mixed operation is possible: maintained mode, non-maintained mode, switched maintained light (L'). An ideal way of supplying several fire compartments.



ONLITE central CPS
The central battery system for projects of any size

Every central battery system is designed project-specifically on the basis of a modular system. This produces solutions which are optimised in terms of the cost and functionality of the system. The modular design of ONLITE central CPS guarantees a tailor-made solution for any project and a significantly optimised cost/functionality ratio.



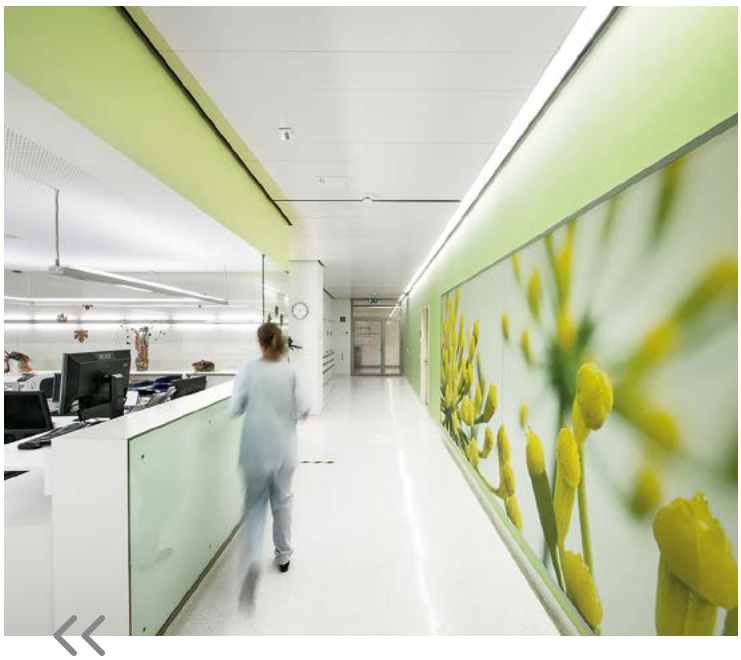
Sustainable lighting enhances people's sense of well-being

Municipal Hospital, Dornbirn | AT

Dornbirn hospital opened its doors in 1984. Ever since, the number of patients in need of care has grown, thus making it necessary to enlarge the available space when the hospital was refurbished in 2000. Another crucial aspect of this refurbishment was a sustainable design concept that would deal with resources responsibly and have a positive impact on patients' and employees' well-being by creating an agreeable atmosphere.

The brief was therefore a sustainable lighting solution that would create a feel-good ambience for patients and employees without making any compromises in terms of lighting quality. At present, Dornbirn hospital has 284 beds and all the important specialist departments that are part of a modern hospital. The requirements placed on the lighting were just as extensive and diverse as are the individual hospital wards.

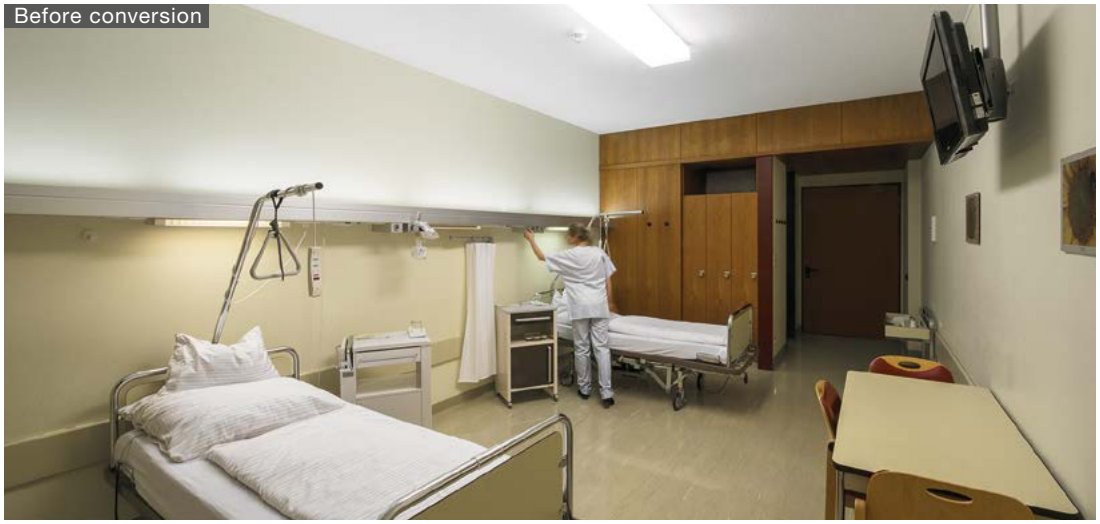
Among other luminaires, the integral lighting solution comprises LIGHT FIELDS recessed luminaires in examination rooms in order to create a bright, calming atmosphere. SLOTLIGHT light lines in the corridors blend in unobtrusively thanks to their plain stylistic idiom, thereby accentuating the building's architectural effect. In patient rooms, the client opted for the highly efficient SUPERSYSTEM lighting system that can be used very flexibly and delivers pleasant room lighting. The PURELINE supply unit is perfectly matched to patients' needs, as it offers both reading and examination light but is also a medical supply unit.



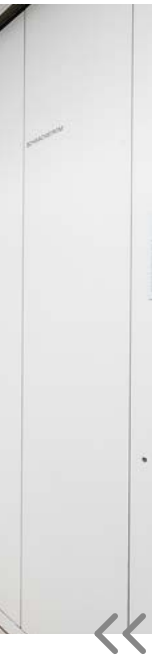
Overall design:
Architekturbüro Gohm und Hiessberger, Feldkirch | AT

Lighting solution:
Corridor: SLOTLIGHT fluorescent lamp
Patient rooms: SUPERSYSTEM + PURELINE (LED reading light)
LIGHT FIELDS in examination rooms

Before conversion



After conversion



Dynamic lighting
Karolinska University Hospital, Huddinge | SE

Fit for the nightshift

When the post-operative ward at the Karolinska University Hospital in Huddinge, south of Stockholm, was relocated, a new lighting solution was also installed. Staff who work nights are especially appreciative of the new, cyclically-controlled lighting because they now feel fitter and more productive at work.

The new lighting solution implemented by Zumtobel together with designers from Teknoplan and Locum relies on dynamic light. This means that that lighting cycles are adapted to suit shift working. In the evening and morning, when a new shift starts or ends, the lighting is somewhat warmer and muted. This gently prepares the body for the start of work or the later rest phase at home. The lighting intensity is highest at around three o'clock in the morning when the nightshift is at its busiest. Employees find this stimulating and it prevents any dip in their ability to perform. The best effect is obtained by using light that is as similar as possible to natural daylight. This is why colour temperatures vary from 2700 to 6500 K.

A total of 150 MELLOW LIGHT V recessed luminaires were installed. Thanks to LUXMATE Emotion lighting management, various lighting scenarios – ranging from intense ceiling lighting through to unobtrusive night-time lighting – can be called up easily and even be adapted as required.

Lighting solutions: ML IV T16
Interface: LUXMATE Emotion touch panel
Number of luminaires: 150
Power consumption/square metre: 2.68 W/m² / 100 lx
Consultant: Teknoplan
Contractor: Locum

This project was announced and published published in Energi & Miljö magazine in December 2012.

Research project
St. Katharina Residential Care Home, Vienna | AT

Improved quality of life for resident dementia patients

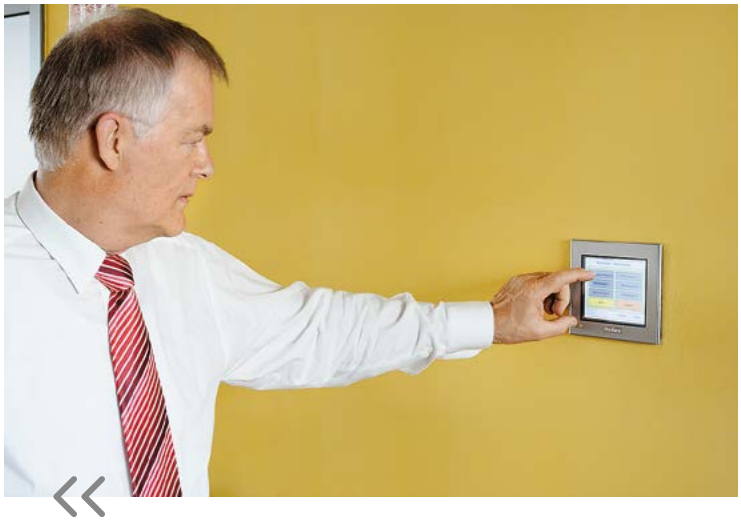
Everyone needs a certain amount of daylight. Elderly people who suffer from dementia and live in a care home often get too little natural light. This disrupts their sleep/wake rhythms. There are no strong dawn/dusk phases to provide cues for their body clock and they find it very difficult to establish a settled rhythm of life. This is where an intelligent lighting solution can help to make a significant contribution to patients' and care staff's sense of well-being.

A research project conducted at the St. Katharina residential care home in Vienna provides the latest evidence confirming the effectiveness of artificial lighting. This study revealed that both residents and care staff respond particularly positively to light having an illuminance of 1500 lx and 6500 K – and that this has effects in an extremely wide right of areas. For example, a more restful sleep phase with fewer sleep interruptions was observed. Some residents who had been anxious during the day became calmer, and there was a significant improvement in communication as well. Even involvement in domestic activities increased.

This interdisciplinary research project is subsidised and supported by the national "Kompetenznetzwerk Licht". The main area of interest is to obtain sound evidence of the effects of lighting on residents in a care home. The renovation of a care home in Vienna provided an opportunity to put this project into action. Thirteen residents of the St. Katherina care home in Vienna and the staff took part in this study.

St. Katharina Residential Care Home, Vienna | AT
Architects: Peretti + Peretti, Vienna | AT
Lighting solution: CIELOS luminous ceiling, MELLOW LIGHT IV recessed luminaires, VIVO spotlights, 2LIGHT MINI downlights, KAVA LED RGB wall-mounted luminaires, LUXMATE PROFESSIONAL lighting management system

More information about the St. Katherina research project is available at:
zumtobel.com/healthcare



Global partnerships
Closely meshed network

GreenHospital®

What are the distinguishing features of a “green” hospital? What must it be able to do and how is it different to present-day clinics? What contribution can it make towards a sustainable healthcare system?

These are the issues that “Green Hospital”, an international alliance of clinics, doctors, experts and companies set up by Asklepios Clinics, is getting to grips with. They are committed to sustainable preventive medical care and responsible use of energy resources in line with ecological principles. An awareness that humans are just a small part of the ecosystem they live in and that their well-being is heavily dependent on the state of this ecosystem is synonymous with a new mind-set that is supported and promoted by a broad, political, ecological and socio-cultural consensus.

Green Hospital aims to use innovative efficiency and quality models to flag up relevant solution scenarios for clinics and healthcare facilities. These are intended to help achieve the following objectives in the case of new buildings, conversions and refurbishment and modernisation projects:

– Significant reduction in environmental impact by using natural resources in an ecologically and economically responsible manner
– Protect and promote health and well-being of individuals as part of preventive medical care
– Ecologically responsible, sustainable construction practices based on energy-efficient technologies and the use of materials that are environmentally compatible and not detrimental to health

Light plays a crucial role in many areas of the Green Hospital Programme. Used correctly, it makes a vital contribution towards improving health and well-being. Lighting is therefore viewed not merely as a technology-driven product, but as an element that is just as important to human health as fresh air and clean water.

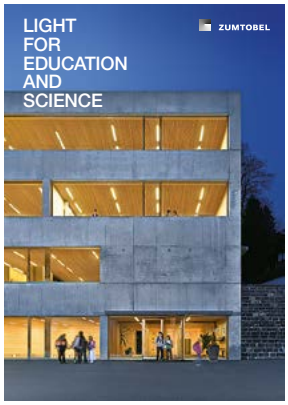
Many Green Hospital research projects concentrate on finding an ideal balance between energy-efficient technology and good lighting quality. Lighting accounts for roughly a quarter of clinics’ electricity bills on average. Many of them are still using obsolete lighting systems. Integrated supply systems with innovative lighting solutions that include intelligent controls provide plenty of scope for energy savings. LED technology can also make a significant contribution.

As part of this Programme, Zumtobel is devising innovative lighting solutions for all healthcare work and lounge areas.

“The Green Hospital initiative launched by Asklepios Clinics and its partners aspires to be a “pioneer and trailblazer” on the road towards ecologically-focussed sustainability in future healthcare. The Programme’s main emphasis is on protecting the environment and patients. As healthcare facilities and service centres for patients and employees, clinics, more than any other healthcare facility, are perfectly positioned to shoulder this responsibility.”

Lothar Dörr
Green Hospital Program Director

zumtobel.com/office



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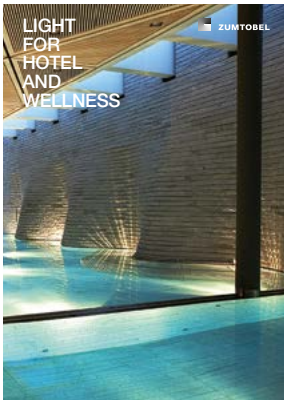

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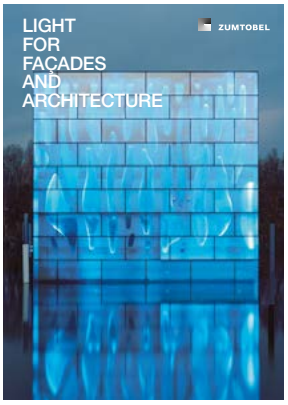

zumtobel.com/facade

Zumtobel, a company of the Zumtobel Group, is an internationally leading supplier of integral lighting solutions for professional indoor and outdoor building lighting applications.

- Offices and Communication
- Education and Science
- Presentation and Retail
- Hotel and Wellness
- Art and Culture
- Health and Care
- Industry and Engineering
- Façades and Architecture

We provide unique customer benefits by integrating technology, design, emotion and energy efficiency. Under the Humanergy Balance concept, we combine the best possible ergonomic lighting quality for an individual's well-being with the responsible use of energy resources. The company's own sales organisations in twenty countries, as well as commercial agencies in fifty other countries, form an international network of experts and design partners providing professional lighting consulting, design assistance and comprehensive services.

Lighting and sustainability

In line with our corporate philosophy *"We want to use light to create worlds of experience, make work easier and improve communications and safety while remaining fully aware of our responsibility to the environment"*, Zumtobel offers energy-efficient high-quality products, while at the same time making sure that our production processes based on the considerate use of resources are environmentally compatible.

zumtobel.com/sustainability

5
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As a globally leading luminaire manufacturer, Zumtobel provides a five year manufacturer's guarantee on all Zumtobel branded products in accordance with the terms of guarantee at **zumtobel.com/guarantee**.

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