



# An energy-efficient future

Sustainable lighting





## An energy-efficient future

When taking a closer look at any lighting solution, you will discover significant energy-saving potential. Innovative, highly efficient LED solutions can make a major contribution to sustainably reducing a building's operating costs. Be it for a school building, an office, or a store – the right lighting is an important lever for efficient building management. The first approach is the use of high-quality LEDs and control gear, and XAL adapts product designs to achieve the highest light output with the lowest possible power consumption.

The second approach is integrating intelligent lighting controls with motion and daylight sensors. Ultimately, however, we should all be driven to use our resources responsibly. For a sustainable future.



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## It is about more than efficient LEDs

The requirements for sustainable lighting solutions are high and go beyond efficiency, long service life, and high light quality. The demands also concern the materials, which must be recyclable and free of toxic substances. Furthermore, high user comfort and easy maintenance should be considered. Sustainable lighting should save energy and thus costs. The potential of sustainable lighting can therefore only be exploited if it forms one unit with lighting control and modern lighting technology. It is also important to know that the savings potential extends

beyond lighting. 50% of a building's energy consumption is due to HVAC (Heating, Ventilation, Air Conditioning). With XAL's environmental sensor technology (measurement of CO<sub>2</sub>, temperature, humidity) we can affect this proportion. This means only ventilate when necessary, or heat less. When users are absent, the ventilation system switches to minimum operation and the heating output is reduced. XAL's IoT sensors are perfect for monitoring entire buildings in an energy-efficient manner.

“What does sustainability mean in the field of lighting? What are the main influencing factors, which guidelines and certificates support us, and how can sustainable lighting lead to permanent cost savings? We in product development make a significant contribution to the composition of material, highly efficient LEDs, and intelligent sensor technology to provide you with outstanding and energy-saving lighting solutions.”

Manuel Feier, Head of Product Management XAL GmbH



## Framework

Due to the massive increase in energy costs and the final phase-out of linear fluorescent lamps on 24 August 2023, it is essential to take a close look at lighting solutions. Increased energy prices do not have to mean 'lights out'. Switching instead of switching off is the way to go. Retrofitting and sensor technology play a major role here.

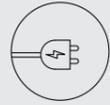
When fluorescent lamps are converted to LED luminaires, running costs can be noticeably reduced and energy consumption sustainably lowered. Lighting control and clever, considered lighting design open up additional savings potential.

## Did you know ...



### 90%

of energy is consumed during use\*



### 46%

of energy costs in a fashion store are for lighting



### 45%

of energy costs in an office can be saved by using sensors



### 19%

of the total building energy consumption in the non-residential sector is accounted for by lighting (70% is accounted for by heating)

### Lighting requirements

Government requirements ensure that important sustainability goals are met both in lighting technology and in the building process. Lighting designers are bound by specifications of application standards such as DIN EN 12464-1 for the lighting of indoor workplaces. The requirements were significantly expanded in the current 2021-12 edition. For example, the minimum illuminance value for the visual task area in classrooms has increased from 300 lux to 500–1000 lux. Energy-efficient LED luminaires provide the required increased illuminance without additional consumption.

### Sustainable buildings

Certification of buildings according to sustainability criteria has arrived in practice. The DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen, German Sustainable Building Council) has become established. Buildings have already been certified according to the DGNB system in over 30 countries. In Austria, it is the ÖGNI (Österreichische Gesellschaft für Nachhaltige Immobilien, Austrian Sustainable Building Council). Internationally, the U.S. Green Building Council's LEED certificate (Leadership in Energy and Environmental Design) is leading.

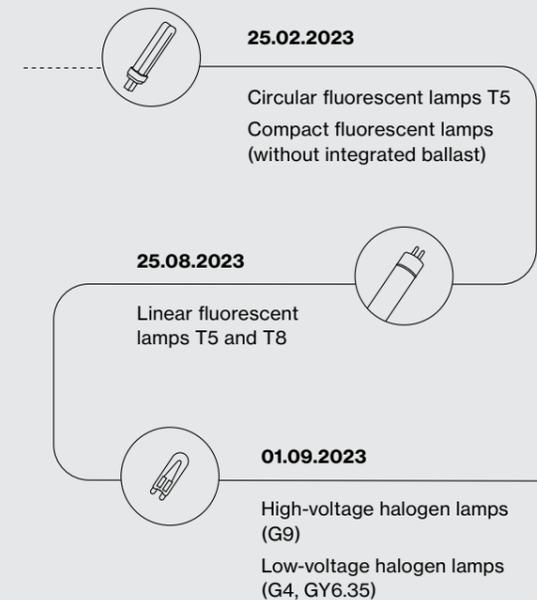
Today, the focus goes beyond resource conservation and cost efficiency to include user comfort and health promotion, which the WELL Building Standard supports. Modern lighting technology makes a valuable contribution to sustainable management. High-quality lighting that uses efficient light sources and intelligent technology is an important criterion for successful certification, in addition to the spatial effect.

### Ban on fluorescent lamps

Modern lighting technology contributes significantly to sustainability. Inefficient and environmentally harmful light sources have therefore been and are being removed from the European market. Since February 2023, the sales ban for compact fluorescent lamps and circular fluorescent lamps has been in effect, and the ban for linear fluorescent lamps T5 and T8 since August 2023.

The ban has immediate benefits for consumers: Retrofitting to LED technology saves up to 80 percent in energy. Compared to fluorescent luminaires, LED luminaires have significantly better light control and a much longer service life. At the workplace, for example, they provide 20 percent more illuminance with the same luminous flux. Up to 30 percent of the investment costs for retrofitting are also subsidised.

### Phasing out of conventional light sources



### Sustainable products

At the product level in Europe, requirements for energy consumption-related products (EPD – Environmental Product Declaration) are specified within the framework of the Ecodesign Directive. Especially regarding the environmental certification of buildings, EPDs make a significant contribution as they make it easy and quick to understand how high a luminaire's contribution to the greenhouse effect is, which raw materials were used, or how high the consumption of primary energy is. When assessing the life cycle, the total consumption of primary energy is recorded.

Over a lighting system's entire life cycle, it becomes clear that over 90 percent of the energy is consumed during use. This means that power consumption is by far the most important factor in a luminaire's energy balance and the actual cost driver. We therefore establish an important foundation for efficiency in the use phase as early as the product development stage. With the continuous improvement of efficiency, the luminaire's power consumption also reduces the users' CO<sub>2</sub> footprint. With integrated lighting control, power consumption can be reduced even further. XAL is fully committed to making a luminaire's entire manufacturing process environmentally friendly, from transport to production to packaging.

For example, the supply chain for one of our top-selling standard products was adjusted to reduce emissions. The tracks (a plastic profile with copper conductors) for the MOVE IT system have been sourced from Europe rather than China since February 2023, which is more sustainable thanks to shorter transport distances and a greener electricity mix for production in Europe.



# Office



## More well-being, less consumption

The figures speak for themselves: More than 75 percent of office lighting is outdated. The energy-saving potential in office buildings is great. In addition to reducing operating costs, however, increasing productivity and creating a 'feel-good atmosphere' at the workplace through good lighting is also a major issue.

High-quality lighting solutions contribute to improved visual comfort and well-being at the workplace. In combination with intelligent lighting control, the luminaires ensure a pleasant climate and save energy. Integrated sensor technology controls the light according to daylight incidence or presence and adjusts illuminance and light colour according to the ambient factors.

### Recommendations

- Use sensors to dynamically adjust the light to the amount of daylight
- Save additional energy by dimming or switching off when no one is present
- Use Tunable White luminaires to adjust the light colour to the daylight curve and create a greater sense of well-being
- Using sensors to assess indoor workplace climate

### TASK



### BETO





FlexOffice, Messeturm Basel  
 Basel, CH – by FlexOffice (Switzerland) AG  
 with lighting design by Sebastian Godenzi



## One meets all

### FlexOffice Basel, Switzerland

The approach to lighting and acoustic planning for the FlexOffice in the Messeturm Basel ran contrary to classic workplace concept planning. FlexOffice was based on a transformative spatial concept where future tenants enjoy enormous flexibility (thanks to modular adaptation of the rooms) while simultaneously saving energy. In addition to the flexible, demand-oriented, resource-saving requirements of a modern workplace, it was important to the owners of FlexOffice to consider the sensual and emotional components. Three lighting components (direct, indirect, and atmospheric light) were therefore developed for the MOVE IT 45 system to fulfil these requirements. This enables classic work zones, communicative meeting places, and vertical areas to be individually illuminated and controlled.

DALI lighting control makes a significant contribution to reducing resource consumption while daylight and presence control are energy-optimised thanks to the programmed swarm function. This means that if only one person is still at the workstation, the lighting modules on the ceiling are operated concentrically with reduced power around the employee.

**FlexOffice, Messeturm Basel**  
Basel, CH – by FlexOffice (Switzerland) AG  
with lighting design by Sebastian Godenzi





Grandstands at Horse Racetrack Vienna, AT –  
by Martin Kohlbauer  
with interior design by Marcel Wanders studio



## Tradition meets innovation

### Grandstands at Horse Racetrack Vienna, Austria

The racetrack's building had been unused for over 70 years but was transformed into an office of the future during its three years of renovation. During the revitalisation, the 'Activity-Based Working' model for modern working was applied. For the implementation of this concept, the BETO floor lamp was customised and equipped with advanced sensor technology. The sensors measure light intensity, noise level, air quality, presence, and temperature.

### BETO with IoT Sensor

The information BETO collects is sent to a cloud from which either automated processes are run, or information is recorded for optimisation. Within daily routines, for example, this allows workplace occupancy or exceeding a specified sound level threshold at the workstation to be communicated via control lights. The customised free-standing luminaires thus offer the user greater comfort, reduce operating costs, and contribute to running the building in a more environmentally friendly manner.

“The innovation is that a vast amount of sensor technology and intelligence has been integrated almost invisibly into a stylish office luminaire, with the data completely open to access by the customer's existing systems.”

Christopher Grießler, Department Head Digital Solutions XAL GmbH



**Christopher Grießler**  
Department Head Digital Solutions XAL GmbH

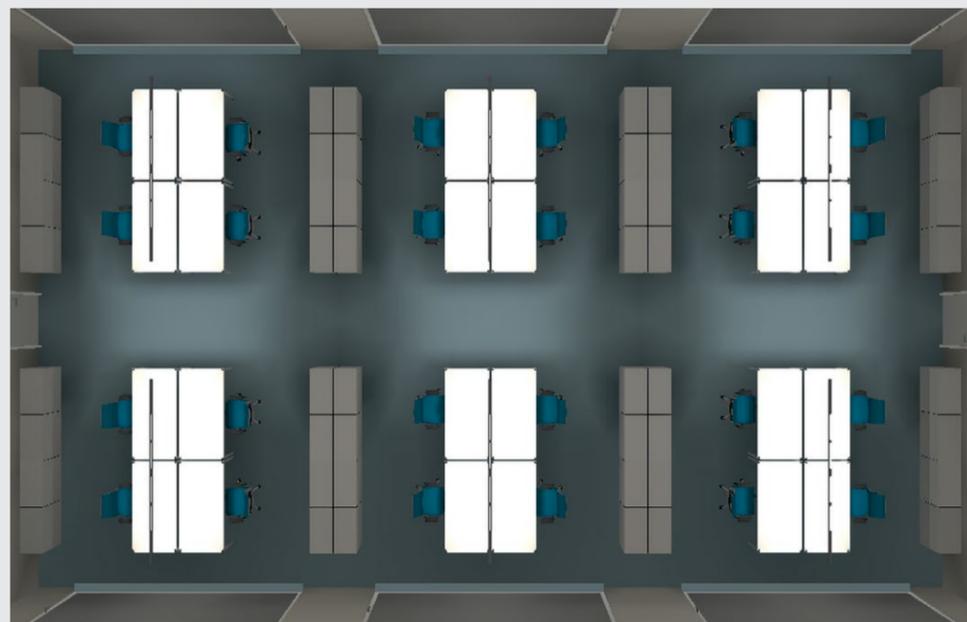


**Grandstands at Horse Racetrack Vienna, AT** –  
by Martin Kohlbauer  
with interior design by Marcel Wanders studio

# Planning examples

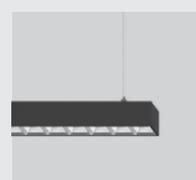
## Office

In this open-plan office with 24 workstations, 12 fluorescent profile luminaires were replaced by 6 BETO LED luminaires. The glare-free luminaires already save 48 percent energy and can offer additional energy saving potential through controls and thus also adapt the lighting to the needs in the room.



**Room details**  
Floor area: 161.6m<sup>2</sup>  
Room height: 2.85m

### Comparison: Lighting system luminaires



Operating data	MINO 60 Fluorescent	BETO LED
Luminous flux	4155 lm	13380 lm
Light colour (CRI)	4000 K (CRI 80)	4000 K (CRI 80)
UGR	≤19	≤19
Power consumption	84 W	86 W
Efficiency	49.5 lm/W	156 lm/W
Technology	Fluorescent T5 (2 × 35 W)	LED
Dimensions	L 2900 × W 60 × H 80 mm	L 3057 × W 42 × H 42 mm
Light distribution	direct / indirect	direct / indirect
Quantity	12 pcs.	6 pcs.

### Comparison: old lighting system vs. new lighting system

#### Lighting system in on/off mode (switch only)

Operating data	Old system (fluorescent) on/off switch only	New system (LED) switched on/off
Lighting system	MINO 60 D/I – T5/16	BETO suspended D/I DALI
Light output (%)	100 %	100 % (not dimmed)
Illuminance E <sub>m</sub> *	500 lx	860 lx
Uniformity U <sub>0</sub> *	0.62	0.70
Power consumption (W)	1006 W	518 W
Power consumption area (W/m <sup>2</sup> )	6.2 W/m <sup>2</sup>	3.2 W/m <sup>2</sup>
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>48 %</b>

#### Lighting system in DALI mode (dimmable)

Operating data	Old system (fluorescent) on/off switch only	New system (LED) dimmed
Lighting system	MINO 60 D/I – T5/16	BETO suspended D/I DALI
Light output (%)	100 %	87 % (dimmed)
Illuminance E <sub>m</sub> *	500 lx	750 lx
Uniformity U <sub>0</sub> *	0.62	0.70
Power consumption (W)	1006 W	451 W
Power consumption area (W/m <sup>2</sup> )	6.2 W/m <sup>2</sup>	2.8 W/m <sup>2</sup>
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>55 %</b>

\* The E<sub>m</sub> specifications refer to the standard-compliant illumination of the visual task. The values for the immediate surroundings and the background in the planning example are also standard-compliant according to DIN EN 12464-1

### Benefits of retrofitting lighting



Low maintenance costs and high rated service life L90 @ 50.000 h



High energy saving potential with significantly higher light output compared to the old system – up to 55% energy / CO<sub>2</sub> savings compared to old systems with dimming, with increased illuminance with 750 lx maintenance value (according to DIN EN 12464-1)

# Retail



## Plan and monitor well

The largest share of energy costs in the non-food sector is lighting at 46 percent (source: EHI/ Klimakongress). The demand for highly efficient lighting solutions is therefore increasing. Shops that already rely on LED lighting are again confronted with the need to upgrade first-generation LEDs due to refurbishment cycles. Innovative lighting control and energy monitoring create the preferred atmosphere while saving additional energy. To implement this often requires new lighting design concepts: reducing the number of luminaires, using light only where it is needed, and lowering output at low-frequency times. However, to ensure that this does not happen at the expense of lighting quality, high-quality lighting solutions are required. Replacing first-generation LEDs has an energy-saving potential of at least 50 percent. Intelligent control can save an additional 25 to 45 percent. SASSO can, for instance, be fitted with IoT sensor inserts, be elegantly integrated into shops, and offers presence- and brightness-dependent control.

The SLR (Single Lighting Regulation) is currently working on an energy-efficient assessment of higher colour rendering. Higher colour rendering facilitates better visual performance for the human eye. By increasing colour rendering from Ra>80 to Ra>90, for example, illuminance can thus be reduced by 6 percent to achieve the same visual performance. Higher colour rendering is therefore a building block for saving energy.

### Recommendations

- Reduce the number of luminaires
- Use light only where needed
- Reduce power at low-traffic times
- Control shop window lighting separately and switch off during direct daylight hours
- Use luminaires with higher colour-rendering properties

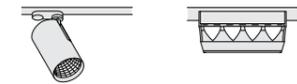
### SASSO

### TWIST



### VARO 80

### SQUADRO





Kastner & Öhler, Kaufhaus Tyrol Innsbruck, AT –  
by DIOMA AG / WHIR3 / K&Ö Bauabteilung  
with lighting design by VEDDER.LICHTMANAGEMENT

“The strength of bricks-and-mortar retail is the immediate visual and haptic experience of the products. New lighting design strategies are therefore needed to focus on the right energy-saving technologies.”

Reinhard Vedder, lighting designer, VEDDER.LICHTMANAGEMENT



Reinhard Vedder  
Lighting designer, VEDDER.LICHTMANAGEMENT

## Not at the expense of quality

High-quality light, as produced by full-spectrum lamps, has always had a special significance for people's perception and experience. Light therapy against depression is the best example of this. Of course, the textile merchant, just like the fruit seller around the corner, also knows that high-quality light makes their products particularly tempting. At the dawn of LED technology, efficient lamps that produced a lot of light from little electricity were available, but this light was not of particularly good quality. This has changed radically within a few years. Today, LED lamps are available that have the same light quality as a halogen lamp or the sunlight whose power and magic are experienced by people enjoying the sunrise on a mountain peak or the sunset on a beach.

The question now is: Does bricks-and-mortar retail need exactly this outstanding light quality to offer its goods in a particularly convincing way? And does this light really help to sell more products, perhaps even at a better price?

Engineers and energy consultants calculate that a highly efficient light source consumes about 15 percent less energy than an LED with a higher colour rendering index.

In purely mathematical terms, it therefore makes a considerable difference whether 1000 spotlights with 30 or 26 watts are used on the sales floor. Only based on technical data, a lamp is used that makes more sense for industrial and commercial areas. But this is not how human eyes, brains, and certainly not stomachs, work when it comes to bringing people back to the city centres and appealing to them emotionally.

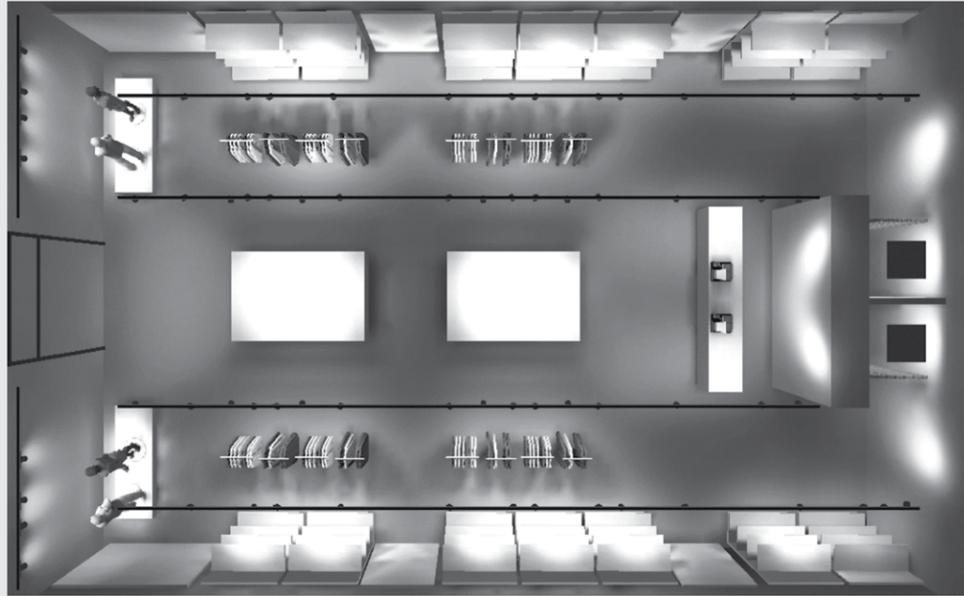
This is clearly shown by lighting tests in retail. With a very good colour rendering index, the light in most retail spaces can be dimmed by more than 25 percent without customers noticing. The majority of the test persons surveyed experienced the luminosity of the products and the authentic overall effect of the sales floor as more enticing and impressive when dimmed by 40 to 50 percent. With rising electricity costs, even the additional expense for lighting control over the entire area pays for itself within a very short time. Thus, as lighting architects, we are already implementing projects like Kastner & Öhler in Innsbruck, together with sustainably producing manufacturers, and save the most energy by using the best light qualities.

**Kastner & Öhler, Kaufhaus Tyrol**  
Innsbruck, AT –  
by DIOMA AG / WHIR3 / K&Ö Bauabteilung  
with lighting design by VEDDER.  
LICHTMANAGEMENT



# Planning examples Retail

In this fashion store, old-generation spotlights were replaced with VARO 80 LEDs on the shop floor and with panel luminaires in the changing rooms. This upgrade can reduce energy use by at least 45 percent. Reducing light output at low-traffic times can save an additional 30 percent.



**Room details**  
Floor area: 9.5 × 7.5 m (72m<sup>2</sup>)  
Room height: 3 m

## Comparison: Lighting system luminaires

2012 / 13		2023	
	<b>LED Gen 1 spotlight (LED)</b> 3-phase spotlight		<b>Traditional Spotlight (HIT/CDMT)</b> 3-phase spotlight
38 W / 4000 K / CRI 90	35 W (38.5 W) / 4000 K / CRI 90	20.5 W / 4000 K / CRI 90	2600 lm (127 lm/W)
2360 lm (70 lm/W)	2150 lm (58.5 lm/W)	L95 @ 50.000 h	52 pcs. – 28° – medium 8 pcs. – 38° – flood 8 pcs. – 17° – spot
L70 @ 50.000 h	L70 @ 12.000 h		
	<b>Suspended luminaire LED</b>		<b>Suspended luminaire fluorescent T5/16</b>
72 W / 4000 K / CRI 90	105 W / 4000 K / CRI 90	37 W / 4000 K / CRI 90	5350 lm (145 lm/W)
4930 lm (68.4 lm/W)	4410 lm (42 lm/W)	L90 @ 50.000 h	2 pcs.
L70 @ 50.000 h	L70 @ 50.000 h		
2 pcs.	2 pcs.		
<b>Power consumption:</b> 2728 W – 19.9 W/m <sup>2</sup>	<b>Power consumption:</b> 2828 W – 20.6 W/m <sup>2</sup>	<b>Power consumption:</b> 1468 W – 10.7 W/m <sup>2</sup>	

## Comparison: old lighting system vs. new lighting system

### Lighting system in on/off mode (switch only)

Operating data	Old system (non-dim)	New system (LED)
Lighting system	3-PH STS spotlight (HIT/CDMT or LED Gen1)	VARO 80 S 3-PH STS spotlight
Light output (%)	100 %	100 %
Illuminance E <sub>m</sub> room	350 lx	750 lx
Illuminance E <sub>m-ver</sub> product vertical	1000 lx	1650 lx
Illuminance E <sub>m-hor</sub> product horizontal	1350 lx	2100 lx
Power consumption (W)	2730 W	1468 W
Power consumption area (W/m <sup>2</sup> )	20.1 W/m <sup>2</sup>	10.7 W/m <sup>2</sup>
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>46 %</b>

### Lighting system in DALI mode (dimmable)

Operating data	Old system 2012/13 (non-dim)	New system 2023 (LED – DIM DALI)
Lighting system	3-PH STS spotlight (HIT/CDMT or LED Gen1)	VARO 80 S 3-PH STS spotlight
Light output (%)	100 %	75 % (dimmed)
Illuminance E <sub>m</sub> room	350 lx	500 lx
Illuminance E <sub>m-ver</sub> product vertical	1000 lx	1200 lx
Illuminance E <sub>m-hor</sub> product horizontal	1350 lx	1500 lx
Power consumption (W)	2730 W	1100 W
Power consumption area (W/m <sup>2</sup> )	20.1 W/m <sup>2</sup>	8 W/m <sup>2</sup>
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>60 %</b>

### Lighting system in DALI mode (dimmable) with presence control concept\*

		8 am to 2 pm / 2 pm to 8 pm (weekdays)
Light output (%)	100 %	50 % / 75 % (dimmed)
Illuminance E <sub>m</sub> room	350 lx	300 / 500 lx
Illuminance E <sub>m-ver</sub> product vertical	1000 lx	800 / 1200 lx
Illuminance E <sub>m-hor</sub> product horizontal	1350 lx	1000 / 1500 lx
Power consumption (W)	2730 W	682 W (average 8 am to 8 pm)
Power consumption area (W/m <sup>2</sup> )	20.1 W/m <sup>2</sup>	5 W/m <sup>2</sup> (average 8 am to 8 pm)
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>75 % (average 8 am to 8 pm)</b>

\*Presence control concept: On weekdays between 8 am and 2 pm, the illuminance is lowered due to lower footfall

## Benefits of lighting retrofitting



Best performance: CRI90 / 3–4000 K / efficiency ≥122 lm/W



Low maintenance costs and high rated service life L90@50.000h



At least 45% energy / CO<sub>2</sub> savings compared to old systems in on-off mode



Up to 75% energy / CO<sub>2</sub> savings compared to old systems with control concept

# Educational institutions



## More than switching on and off

High lighting quality supports performance and contributes to a greater sense of well-being. The key to optimal lighting in classrooms, specialist classrooms, or learning areas is lighting control in combination with efficient LED luminaires. However, public buildings very often still feature outdated systems. Options for refurbishment include replacing the existing luminaires with new designs, or completely new installations.

The best possible energy solutions can be generated by dimmable LED systems. Incentives are also created by subsidies that can be claimed for the refurbishment of public buildings if, for example, energy-efficient luminaires are used. Schools then benefit from significant energy savings and improved lighting quality for the children's maximum well-being.

### Recommendations

- Tunable White luminaires with a daylight curve
- Colour rendering of  $R_a > 90$
- Plan a separate blackboard lighting switch
- Presence detection in rooms
- Entrances with twilight sensor

### VELA



### MINO



### MITA





**Maria-Ward-School** Nuremberg, DE –  
by H2M Architekten  
with lighting design by Gregor Sgonina

## Spiritual and bright

### **Maria-Ward-School, Nuremberg**

The newly built Maria Ward School in Nuremberg is a school that knows no dark corners. It draws its character from the bright, daylight-flooded atrium, places for retreat and exchange, and the continuous wayfinding system. This creates an inspiring environment that motivates students to develop their full potential.

The lighting supports the perception of the building structure. The directional lines of light are recognisable from the outside and lead into the building. To create a smooth transition between classrooms, movement zones, and learning areas, and to promote concentration and well-being, the linear luminaires' illuminance in these adjacent areas is always between 300 and 500 lux.

The energy footprint of the CO<sub>2</sub>-neutral school building is optimised thanks to presence and daylight sensors. The lighting concept achieves a harmonious combination of comfort and functionality for improved well-being and focus. A school without dark corners, but with plenty of space for development.



**Gregor Sgonina**  
Konzeptlicht lighting solutions GmbH

“The use of daylight and presence sensors each have a saving of 25 percent. Combined, this results in an energy saving of 45 percent, achieved purely through the light management system. That impresses us also as a lighting planner.”

Gregor Sgonina, lighting designer, Konzeptlicht lighting solutions GmbH

**Maria-Ward-School** Nuremberg, DE –  
by H2M Architekten  
with lighting design by Gregor Sgonina





Puntigam Campus Graz, AT –  
by Franz und Sue ZT GmbH



## Sustainable through and through

### Puntigam Campus Graz

Franz&Sue architects' vision for the extension of the primary and secondary school in Graz was to design a bright, open, and sustainable school. The well-thought-out lighting concept was a big draw in the architectural competition already. The materials used in this project are also unique: Only natural materials which are both sustainable and simple were used. This is rare in educational construction. The exterior walls are made of vertically perforated bricks with hemp insulation on the outside and clay plaster on the inside, which also ensures a pleasant indoor climate. Wood chips coated with clay and soft wood fibre boards were used under the screed. For energy, a heating and cooling system with deep-well and photovoltaic system was used. An automated window gap ventilation system provides controlled air exchange in the classrooms and also contributes to cooling in summer. The toilets are flushed with rainwater to save drinking water.

“We have created a pleasant atmosphere using standard elements and have turned them into something beautiful. It fits the way we build schools: A robust concept that is cost-efficient, yet also something special.”

Silvia Mládenková, architect, Franz und Sue ZT GmbH



**DI Silvia Mládenková**  
Architect, Franz und Sue ZT GmbH

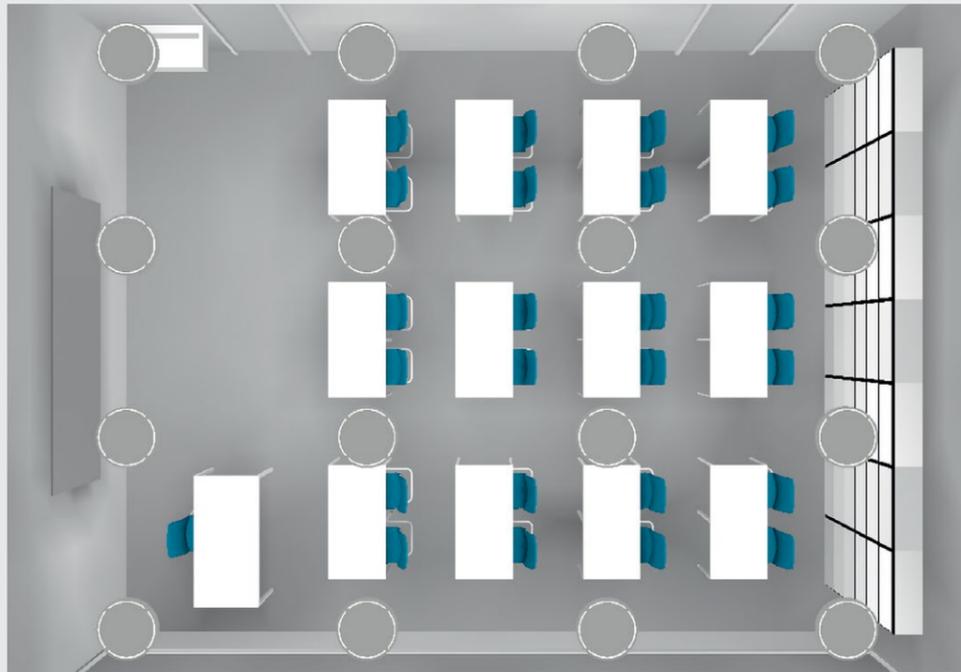


**Puntigam Campus** Graz, AT –  
by Franz und Sue ZT GmbH

# Planning examples

## Education

In this classroom, the first step was to replace the fluorescent lamps with circular LED luminaires, producing an energy saving of 49 percent. If the luminaire is controlled in DIM DALI mode, up to 75 percent energy and CO<sub>2</sub> can be saved.



**Room details**  
Floor area: 9.35 × 7.5 m (70.1m<sup>2</sup>)  
Room height: 3 m

### Comparison: old lighting system vs. new lighting system

#### Lighting system in on/off mode (switch only)

Operating data	Old system (fluorescent) on/off switch only	New system (LED) switched on/off	New system 2 (LED) switched on/off
Lighting system	VELA 600 MP surf – T16-R	VELA 600 MP D/I surf DALI	MITA circle 450 D/I ceiling DALI
Light output (%)	100 %	100 % (not dimmed)	100 % (not dimmed)
Illuminance E <sub>m</sub> *	500 lx	790 lx	1000 lx
Uniformity U <sub>0</sub> *	0.77	0.83	0.80
Power consumption (W)	976 W	496 W	480 W
Power consumption area (W/m <sup>2</sup> )	13.9 W/m <sup>2</sup>	7.1 W/m <sup>2</sup>	6.8 W/m <sup>2</sup>
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>49 %</b>	<b>51 %</b>

#### Lighting system in DALI mode (dimmable)

Operating data	Old system (fluorescent) on/off switch only	New system (LED) dimmed	New system 2 (LED) dimmed
Lighting system	VELA 600 MP surf – T16-R	VELA 600 MP D/I surf DALI	MITA circle 450 D/I ceiling DALI
Light output (%)	100 %	64 % (dimmed)	50 % (dimmed)
Illuminance E <sub>m</sub> *	500 lx	500 lx	500 lx
Uniformity U <sub>0</sub> *	0.77	0.83	0.80
Power consumption (W)	976 W	312 W	240 W
Power consumption area (W/m <sup>2</sup> )	13.9 W/m <sup>2</sup>	4.5 W/m <sup>2</sup>	3.4 W/m <sup>2</sup>
<b>Energy / CO<sub>2</sub> savings (%)</b>	<b>0 %</b>	<b>69 %</b>	<b>76 %</b>

\* Maintenance value of 500 lx illuminance – The E<sub>m</sub> specifications refer to the standard-compliant illumination of the visual task within a room-related lighting design according to DIN EN 12464-1

### Comparison: Lighting system luminaires

	Old system	New system 1	New system 2
			
<b>Operating data</b>	<b>VELA Fluorescent</b>	<b>VELA LED</b>	<b>MITA LED</b>
Luminous flux	3160 lm	4390 lm	4880 lm
Light colour (CRI)	4000 K (CRI 80)	4000 K (CRI 80)	4000 K (CRI 80)
UGR	≤ 19	≤ 19	≤ 19
Power consumption	61 W	31 W	30 W
Efficiency	51.8 lm/W	142 lm/W	163 lm/W
Controls	switchable on/off	DIM DALI	DIM DALI
Dimensions	D 600 mm / H 112 mm	D 600 mm / H 92 mm	D 426 mm / H 72 mm
Light distribution	direct	direct / indirect soft	direct / indirect soft
Quantity	16 pcs.	16 pcs.	16 pcs.

### Benefits of lighting retrofitting



Low maintenance costs and high rated service life L90 @ 50.000 h



Up to 75 % energy / CO<sub>2</sub> savings compared to old systems with dimming and 500 lx maintenance value



State Hospital Neunkirchen, AT



## Improved lighting quality permanently reduced costs

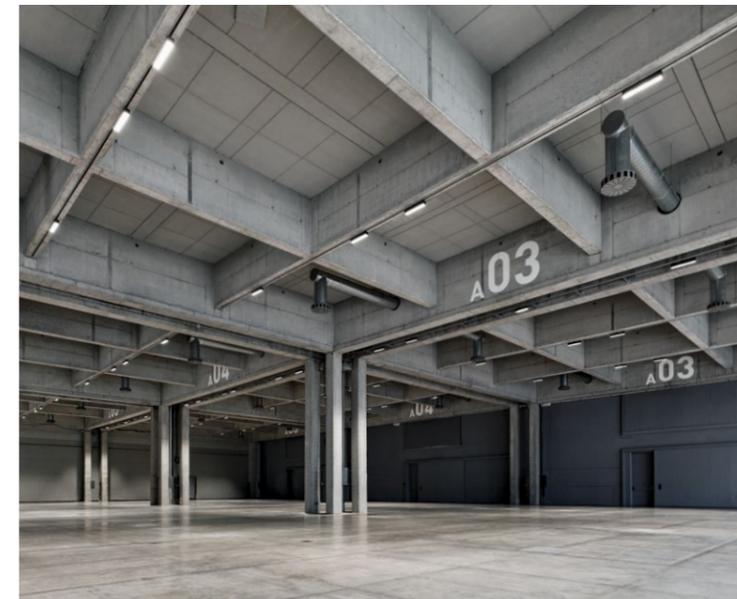
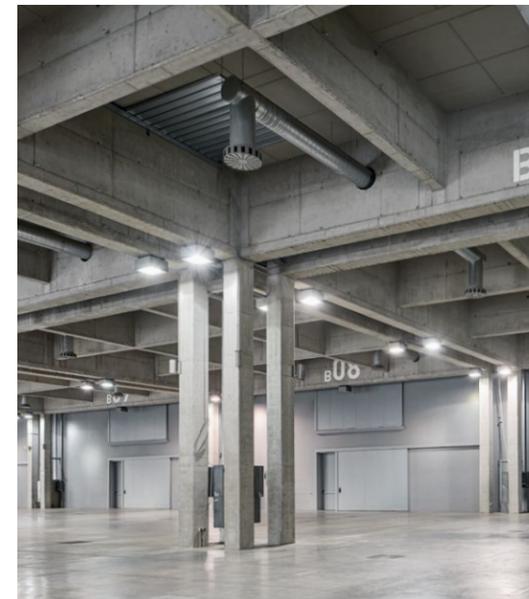
### LED conversion at Neunkirchen Hospital

Outdated lighting systems have higher energy consumption and usually also lower lighting quality. For the Neunkirchen Hospital project, 260 luminaires were upgraded with customised XAL LED conversion kits. The starting point was the calculation of the amortisation through the conversion.

The result speaks for itself. After the conversion, electricity costs have been reduced by around 64 percent per month. The investment costs are amortised after only 32 months. XAL's service included the development of a customised conversion inset for a 1:1 replacement without much effort. As only the inner workings were replaced and not the entire luminaire, this is a very sustainable approach. The hospital now benefits from significant permanent energy savings and improved lighting quality. For maximum well-being for patients, visitors, and staff.

€ 1.7 years  
Amortisation period

↓ -64%  
Energy costs



Comparison: old lighting system (left), XAL UNICO, 4000K (right)

## Efficient, functional, and aesthetic

### Fiera Bolzano LED retrofit

Bolzano Trade Fair's goal is to become Italy's most sustainable trade fair. With the lighting system retrofitted from fluorescent to LED, they are now a significant step closer. It is not only the environmental footprint that has been significantly improved for Hall A, but above all the light quality. A total of 80 UNICO spotlights, installed as bespoke products in tracks and controlled by DALI, create ambience and a pleasant feeling of space. In addition, this solution offers flexibility of use. Specific areas of the hall can be controlled individually and facilitate different scenarios for different events. For director Thomas Mur, the result is the perfect combination of efficiency, economy, functionality, and aesthetic appeal. The tailored solution with the track system also allows for potential future expansion.

"Aesthetically and functionally, the luminaires blend discreetly into the existing architecture. But the most important thing is that we have a much more pleasant light than before – the difference is striking!"

 **-45%**  
Energy costs



**Thomas Mur**  
Bolzano Trade Fair Director

## Everything from a single source

XAL supports the planning, commissioning, and maintenance of controllable lighting systems. The correct dimensioning of converters, cables, luminaires, and sensors is supported, as is the creation of daylight curves and annual lighting programmes.

- Control project planning
- Assembly service from A–Z
- Maintenance service
- LED retrofits
- Building and data management
- Power quality assessment
- After sales services



## LED conversion

XAL offers a conversion service from fluorescent to LED that is as simple as can be. Using special conversion kits, we quickly and easily replace old lamps with modern, highly efficient LEDs. The intervention is minimal and takes only a few minutes.

The insets are both suitable for XAL luminaires as well as for other manufacturers' products.

## XAL guarantee

XAL's guarantee package ensures there are no additional maintenance costs for the first 5 or 7 years. The refurbishment of your lighting installation thus usually pays off after only a few years, depending on the scale of the project and individual use.

## Efficiency service

XAL takes care of the amortisation calculation, dismantling, and disposal of obsolete luminaire components, as well as the installation of the new LED sets. All components are then tested and put into operation. Look forward to better lighting and reduced energy costs.



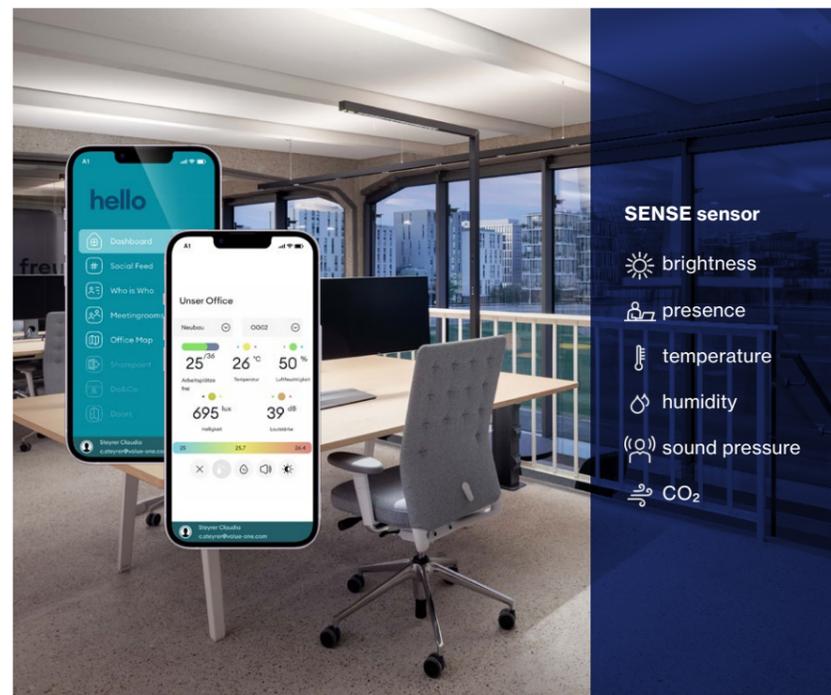
## Ecodesign directive

The Ecodesign Directive, which has been in force in Europe since September 2021, defines efficiency standards not for entire luminaires but for individual components such as LED boards and converters. Luminaire manufacturers must declare the lamp's efficiency by storing the technical data in the European EPREL database. Lamps must meet minimum standards in lm/W, depending on the power class and colour rendering, to be traded in Europe. For example, non-directional lamps operated with a converter, with 2000lm and CRI>90, must have an efficiency of > 104lm/W. To calculate the luminaire's efficiency, the converter's and LED board's efficiencies must be considered in addition to the light output ratio. XAL uses only high-quality components for its luminaires. The efficiencies required by the Ecodesign Directive are generally exceeded.

XAL openly communicates which luminaires' LED modules or converters can be replaced by end users or specialists. This gives confidence in the longevity of the luminaires and is sustainable.

## Smart workspace

Discover your digital solution for efficient offices and satisfied employees. Our app combines energy savings with workplace comfort. Smart sensor lights monitor brightness, light intensity, air quality and temperature – individually for each person workplace. In addition, workplaces and meeting rooms can be easily and quickly get booked.



## XCS customised solutions

Even the widest product range sometimes cannot meet bespoke requirements of a specific project. Together with you, we develop customised lighting solutions that are ideally suited to the specific needs of your project. Depending on the order volume, we realise adaptations to existing XAL products, conversion kits, and completely new developments.



## Funding programmes

Lighting upgrades pays off twice over. The state provides attractive subsidies for the refurbishment of lighting systems. Funding is provided for converting from conventional luminaires to LED systems in existing buildings used for business purposes and for the additional installation of lighting control systems.

The subsidy programmes in particular attach importance to high luminaire efficiency. Minimum efficiencies of, for example, 100lm/W in Austria and 120lm/W in Germany are required to be eligible for funding.

### Austrian subsidies

LED systems indoors <20 kW  
LED conversion for outdoor lighting, indoor lighting ≥ 20kW

### German subsidies

BAFA – Federal funding for efficient buildings (BEG)  
BMU funding programme for the refurbishment of interior lighting in municipal facilities

### Swiss subsidies

Funding programmes for energy-efficient lighting



“By 2030, we will have reduced our Scope 1 and 2 emissions to zero.”

Michael Engel, CEO of XAL Holding GmbH

## XAL's sustainability goals

As a company, we see ourselves as part of a larger whole to which we are committed – now, and for a future worth living. Sustainability has always been a focus of our work: Our products contribute to improving our customers' carbon footprint through energy efficiency as well as to their well-being through ideal light conditions.

Most recently, we have significantly boosted our focus on sustainability through concrete targets, numerous measures, and measurable data: Our Corporate Carbon Footprint supports us in the targeted planning and implementation of environmental measures on the way to our goal of CO<sub>2</sub>-neutral operation at all our locations by 2030 at the latest. They include the construction and use of our own photovoltaic systems, climate-conscious business travel management, and the switch to e-mobility.

Our activities in climate protection as well as social sustainability and ethical corporate governance can be tracked transparently and comprehensibly in our Sustainability Report. In doing so, it was important for us to follow international standards. The Greenhouse Gas Protocol and GRI were the basis for this first report – subsequent

reports will of course consider the latest developments in European reporting standards (CSRD, ESRS). To map our products' ecological footprint over their life cycle and create the basis for environmentally conscious decisions, we have prepared environmental product declarations per ISO 14025 and EN 15804 for several products – and this portfolio is being continuously expanded. We use the results to make our products ever more sustainable.

We have been a member of the UN Global Compact Initiative since 2020, integrating the principles into our interactions with each other, our environment, our supply chain management, and our resource strategy. We believe that our actions and our products' life cycle must be traceable and transparent, which makes alignment with clear standards essential. Accordingly, in addition to ISO 9001, we are certified to the ISO 14001 environmental management standard. We also rely on independent providers to evaluate our corporate social responsibility: Ecovadis regularly assesses our corporate social responsibility holistically and based on objective criteria with a focus on the environment, labour and human rights, ethics, and responsible procurement.



## Get in contact

We have made it our mission to develop and perfect unique projects in cooperation with the architects and planners.

We see ourselves as your partner. From the lighting design to the right product selection and from the control system to commissioning and maintenance, we are at your side at all stages of your project. Let's talk about your project:  
[office@xal.com](mailto:office@xal.com)

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## List of photographers

Lilly Mörz (p.2 | 7 | 44 - 45), Kurt Kuball (p.4 | 10 | 16-17 | 19 | 42-43 ), Jens Pfisterer (p.4 | 22 - 24 | 26 - 27), hertha hurnaus (p.4 | 30), Linus Linter (p.4 | 32 - 35), Z. Gataric Fotografie (p.12 - 15), Ralph König (p.18), VEDDER.LICHTMANAGEMENT (p.25), David Schreyer (p.36 - 37 | 39) René Riller (p.46 - 47), Marco Parisi (p.47)

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