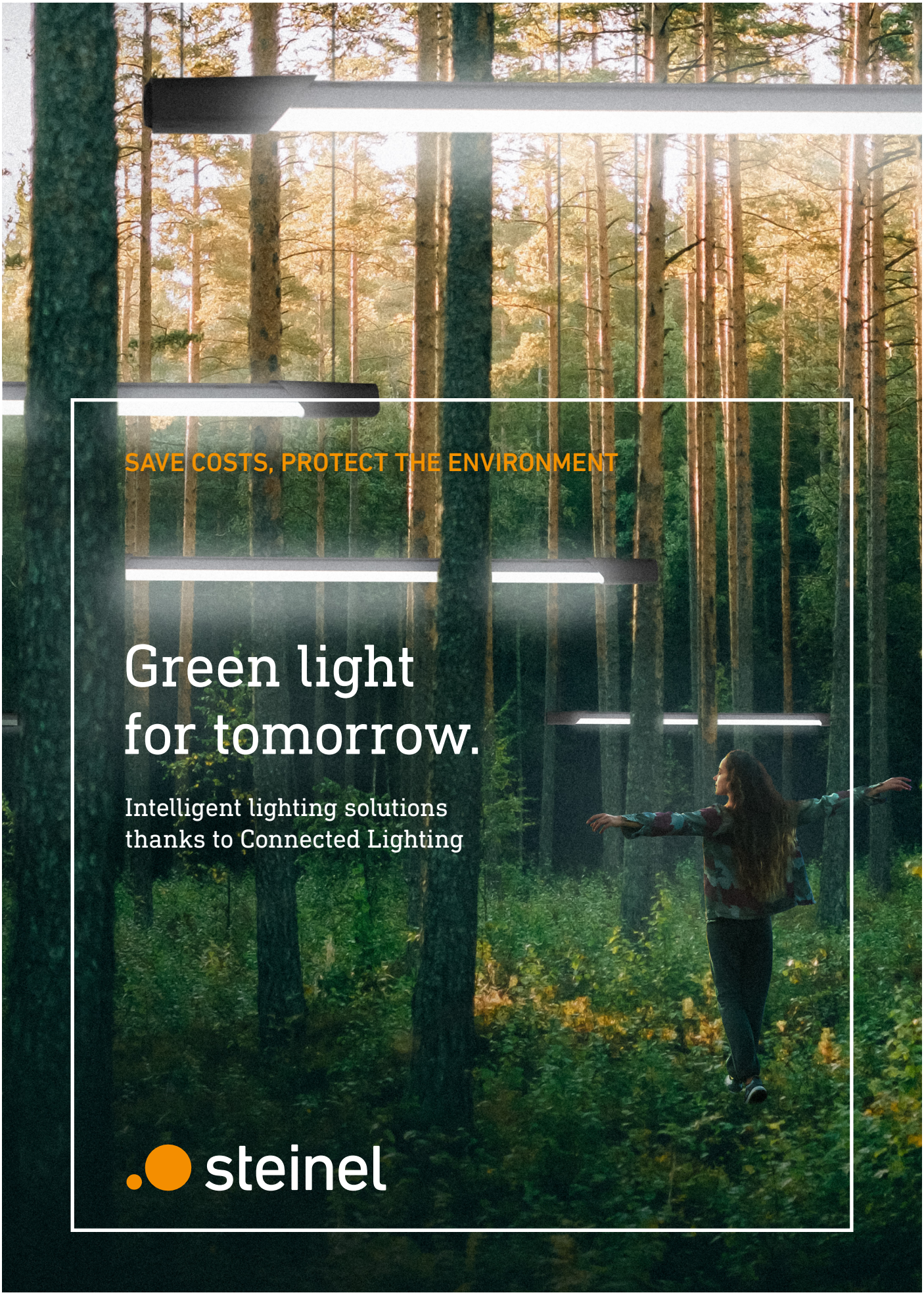

SAVE COSTS, PROTECT THE ENVIRONMENT
Green light
for tomorrow.
Intelligent lighting solutions
thanks to Connected Lighting
steinel

Dear reader,

We can be proud of ourselves. Despite the threat of energy shortages as a result of the Ukraine war and associated sanctions, we coped well during the winter. Time and again, the government called on us to save energy. And in fact, we used almost 5 % less energy overall in 2022 alone. We used 4 % less electricity and almost 15 % less natural gas. Aside from milder temperatures, these savings are largely attributable to the efforts made by each individual. Would you not agree?

It goes without saying that a large proportion of households in Germany made an effort to save energy. According to Statista, 77 % of people reduced the temperature in their homes, 67 % now take shorter showers than before, and over three quarters leave the lights on less often. Saving energy is often associated with going without. But this is not the case with STEINEL lights. In fact, the opposite is true: People enjoy greater comfort when the lighting is simply controlled automatically – and always when it is truly needed.
And savings are made almost incidentally.

Legislators have also recognised the savings potential of lighting and are withdrawing old fluorescent tubes from circulation. From autumn onwards, it will no longer be possible to import T5 and T8 luminaires. While this is undoubtedly a ban, it is also an opportunity to retrofit lighting now. But rather than simply changing the light source and opting for LED lamps, property owners could skip this step and instead opt for Connected Lighting with sensor technology. In this white paper, we explain why and what savings can be achieved without having to go without anything.
Happy reading!

Contents

Connected Lighting

Better than any heat pump

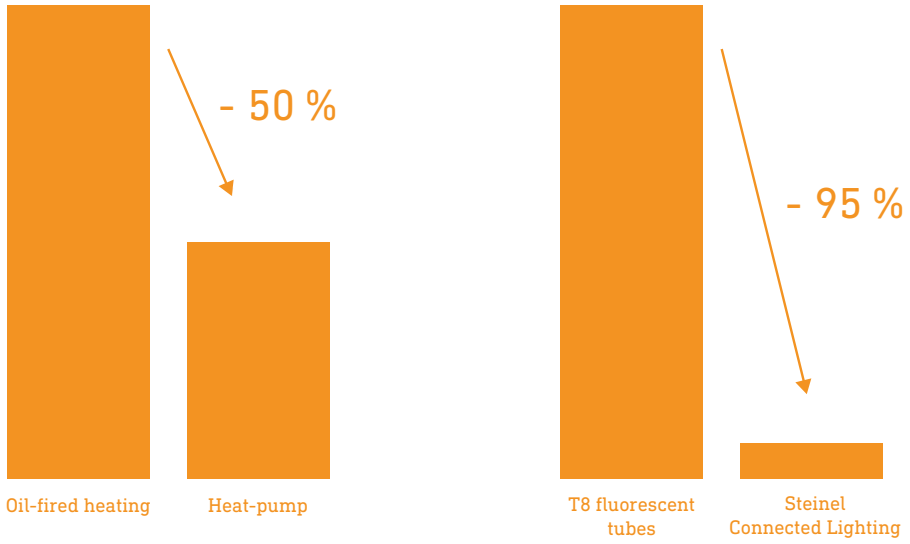
Anyone who built a house in the past decade and opted for oil or gas heating rather than combining a photovoltaic system and heat pump is likely to be annoyed today. While oil and gas prices are continuing to rise, the sun is still shining down from the sky – free of charge. The legal framework will also change. For home builders, this means choosing to retrofit or rebuild sooner or later – in other words, they must invest.

The situation is similar when it comes to lighting. Standards that were common ten years ago are disappearing from the market. In the autumn, T5 and T8 fluorescent tubes will be withdrawn from circulation. Whether personally within your own four walls or professionally in a commercial property, anyone seeking to replace their existing light sources should not only switch to LED. Instead, act with foresight and opt for an intelligent lighting system with efficient, interconnected luminaires and motion sensors. For example, in percentage terms, even more CO_2 can be saved through lighting solutions (95 %) compared with switching from oil-fired heating to a heat pump (50 %).

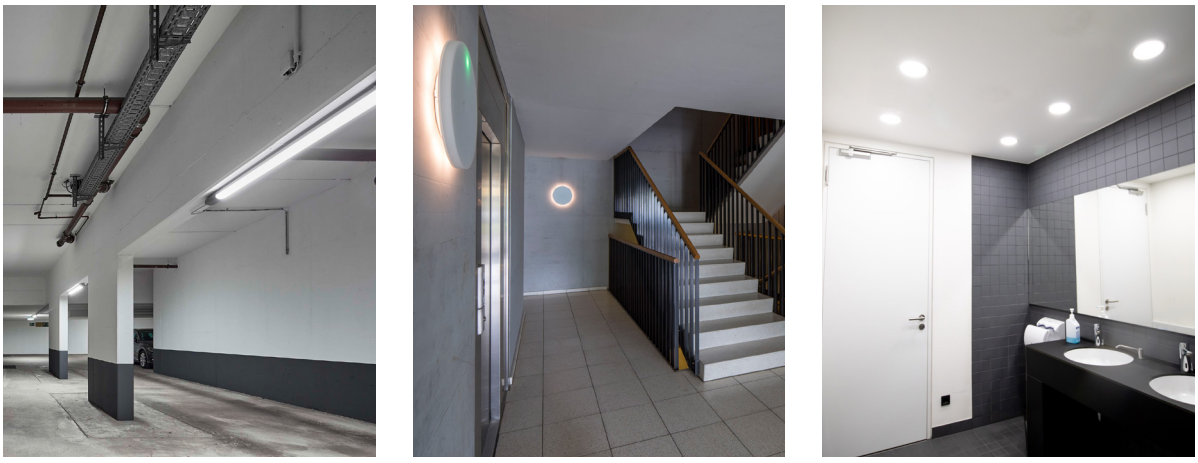
We call this Connected Lighting: The light is only activated where it is truly needed. This is made possible by local light and presence sensors, combined with Bluetooth Mesh networking. The sensor installed in each luminaire detects movement and walking direction, thereby only switching on the light where it is needed. This saves energy, lowers electricity costs and cuts CO_2 emissions. If, for example, a STEINEL sensor light is installed in a multi-storey car park, it demonstrably generates around 20 times less CO_2 per light per year than a normal fluorescent tube, and reduces electricity costs by around € 200.[1] Savings effects that cannot be achieved by merely replacing with LEDs.

1 Life cycle analysis of the linear luminaire RS PRO 5100 SC by Prof. Dr Schmidt, Pforzheim University/INEC Institute, confirmed by Carbotech

Reduction potential of CO emissions in comparison:



Thanks to its CO2 savings effects, Connected Lighting is to lighting what heat pumps are to heating. There is one key difference though: lighting pays for itself much faster than heating.



Connected Lighting can be used in car parks and stairwells, as well as in public bathrooms.

Saving energy

The story so far: saving energy together

Energy-efficient lighting is ubiquitous in everyday life. Surely everyone can still remember traditional light bulbs, which have been banned in the European Union (EU) since 2009. At the time, experts hoped to save 40 terawatt hours of electricity, which roughly equated to Romania's annual consumption, and this is exactly what happened. And everyone knows that LED luminaires consume less energy than their predecessors.

However, the topic of energy saving really came to the fore when war broke out in Ukraine. This has led, for example, to cities and municipalities saving energy when it comes to lighting public buildings. This is a long overdue step – after all, at least one third of electricity costs are attributable to lighting. The city of Munich, for example, believes it has saved around 120,000 kilowatt hours of energy through the measure. This is roughly equivalent to the annual consumption of 40 households on average. But we must also be truthful: The lights are on again in many places.

Nowadays, lights are still left on unnecessarily in a variety of places (examples).

What's still possible: the potential that shines from the ceiling

We therefore need to ask ourselves the following question: How much more energy could we still save when it comes to lighting? The answer? A great deal. Lighting cost factors also include illuminating public stairwells, underground car parks and multi-storey car parks. And in many of these places, the lights are left on 24 hours a day. On the one hand, this is wastes energy, yet it also offers enormous potential: If just ten car parks in a medium-sized German city were converted from classic fluorescent tubes to 300 LED sensor lights each, this alone could save 1,125 tonnes of CO2 – per year. That equates to the average combined carbon footprint of at least 100 people in Germany. But Connected Lighting is not only climate-friendly, but extremely economical, too. Converting a multi-storey car park, for example, usually pays for itself in less than 24 months.[2] In stairwells, the savings effect is just as great: Thanks to the STEINEL R series, up to 94 % of energy use can be saved – and by extension, costs.

What needs to be done now: incentives and clear rules

We need two things to exploit this potential: incentives and clear rules. The savings effect is certainly the biggest incentive. As an example, a luminaire in the STEINEL 5100 series consumes around 94 % less energy per year than a classic fluorescent tube. Calculated using an electricity price of 30 cents per kilowatt hour, this means each luminaire only costs € 9.99 per year instead of € 210.90. Given rising electricity prices, this represents an ever-increasing savings potential.

2 Life cycle analysis of the linear luminaire RS PRO 5100 SC by Prof. Dr Schmidt, Pforzheim University/INEC Institute, confirmed by Carbotech

When it comes to clear rules, the legislator has been slow on the uptake. In fact, very little has happened since light bulbs were banned in 2009. It is true that the energy sector is currently the subject of heated political debate, especially in the wake of the Building Energy Act (GEG). Yet the debate primarily revolves around heat supply – i.e. oil and gas heating systems, as well as heat pumps. Lighting hardly plays a role at all. Other countries are ahead of Germany in this respect. As an example, depending on the state, the USA sets out very precisely which lighting may and may not be installed. Nevertheless, the EU is now following suit by banning fluorescent tubes.

Opportunities

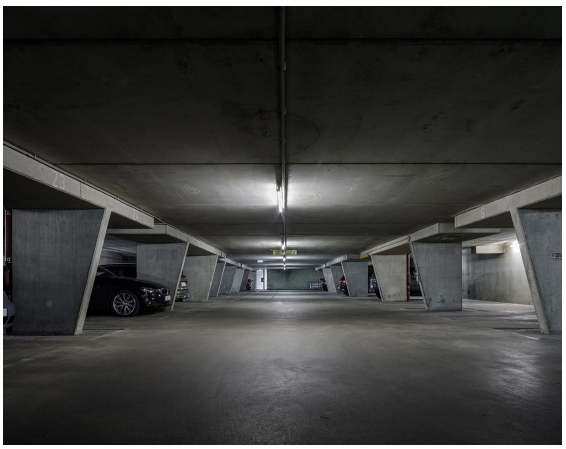
Treating the ban as an opportunity

The import ban on fluorescent tubes is a done deal: Smaller, circular T5 fluorescent lamps have already been banned since the end of February 2023. At the end of August, linear T5 and T8 luminaires will disappear from the market. And four weeks later, it will finally be over for high-wattage halogen lamps. This ban is based on the RoHS Directive, which restricts the use of hazardous substances. In particular, the ban centres around using mercury as a light source. Overleaf, we will answer key questions about what the ban means and what steps property owners should take right now.

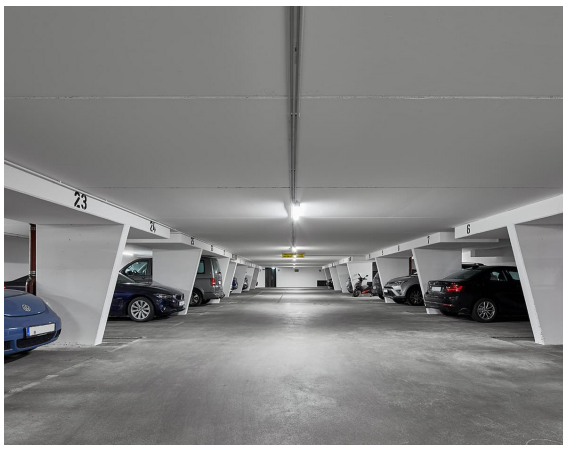
Learn more about the ban here.

FLUORESCENT TUBES WILL SOON BE A THING OF THE PAST

Before



After



FAQ

Key questions and answers

What is the RoHS directive all about?

RoHS stands for "Restriction of Hazardous Substances". Specifically, it deals with the use of mercury in light bulbs. The substance is considered hazardous and has already been banned in electrical appliances. Up until now, exceptions have been made for T5 and T8 fluorescent lamps, compact fluorescent lamps and special purpose lamps. But everything will change by 25 August 2023 at the latest since the adapted RoHS directive bans the import of fluorescent lamps.

Who is affected by the fluorescent tube ban?

Both individuals and companies alike: As T5 and T8 fluorescent tubes will soon no longer be allowed to be imported, they will also no longer be available for purchase. This means that it will soon no longer be possible to install new fluorescent tubes in both private households and commercial properties. For example, **40 percent** of companies alone still use conventional fluorescent lamps. As a result, over **five billion lamps** with old light sources will now gradually disappear from the European market.[3]

What does the fluorescent tube ban mean?

Gradual bans on inefficient light sources resulted in increased production of energy-efficient solutions. These ultimately help to significantly reduce energy costs, thereby also reducing CO_2 emissions from lighting. For consumers – both individuals and commercial entities – this not only represents the need to invest effort but is also an opportunity.

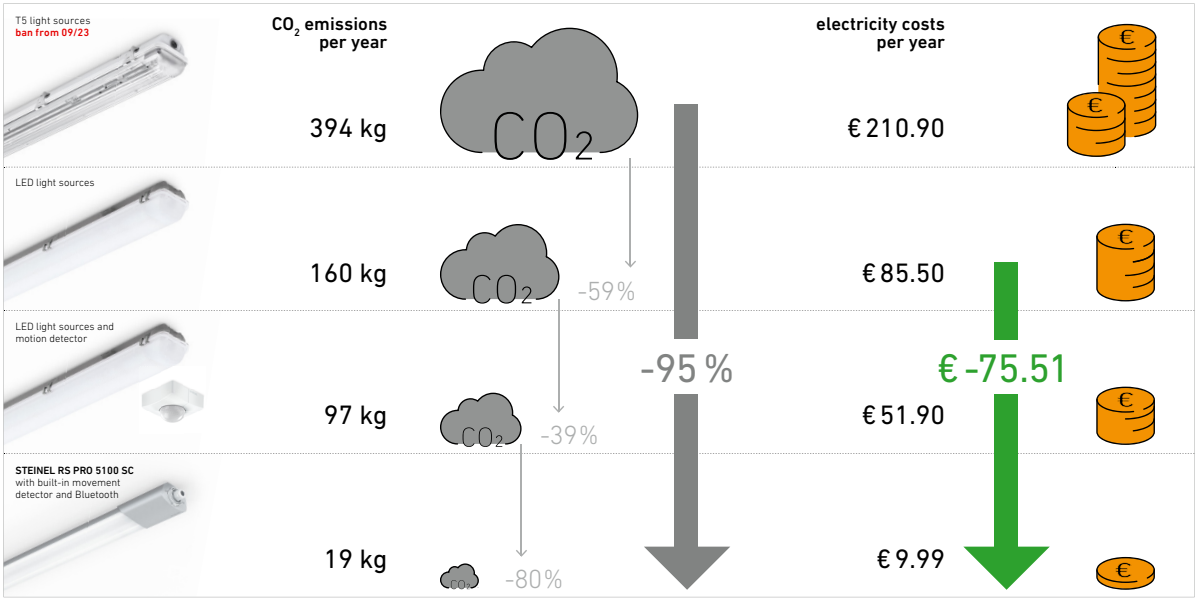
What alternatives are there?

There are three options for consumers. **Firstly:** Fluorescent tubes held in stock may initially continue to be sold. Therefore, consumers can continue to rely on fluorescent lamps in the short term. However, supply will be limited since there are no more supplies being manufactured. Adopting this approach makes little sense in the long term.

3 https://www.watt24.com/en/guide/fluorescent-tubes-ban-2023-all-you-need-to-know/

Secondly: It is more advisable to change the bulb. Here, on the one hand, only the lamp can be changed and converted to LED. On the other hand, it is also possible to replace the entire luminaire. And **thirdly:** If you're going to invest, then do it properly and go for an intelligent lighting system with efficient LED lights, motion sensors and Bluetooth connectivity, like the one STEINEL offers with Connected Lighting.

Comparing lighting technologies



Information per lamp and year

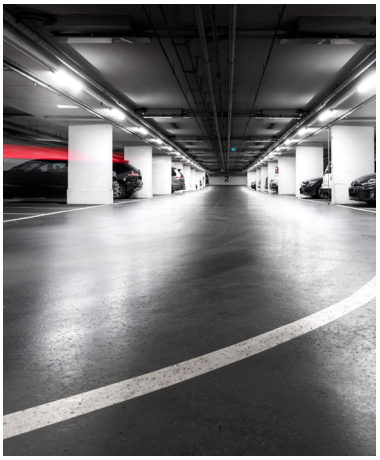
Electricity prices are based on € 0.30 per kWh.
Independent measurements by Swiss Lighting Society | Source: INEC Institute, Steinel

The sustainable way

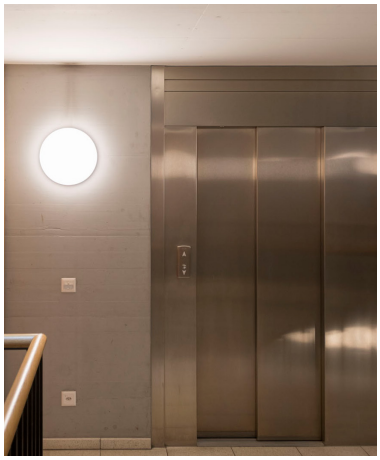
Swapping fluorescent tubes for an intelligent system

Fluorescent tube ban – the wording sounds very negative. And at first glance, this also means consumers will have to put some effort in: Old lighting must be removed and replaced with new lighting. However, this ban actually represents an opportunity – and consumers should take advantage of it now. Those who not only switch to LED luminaires but instead opt for Connected Lighting will save twice in future: On the one hand, the luminaire itself consumes less energy, and on the other hand, it is only switched on when it is truly needed.

STEINEL offers a suitable solution both for converting ring-shaped fluorescent lamps in stairwells, for example, and for replacing old T5 or T8 fluorescent tubes: The R series with round or square luminaires, the 5100 series as a linear luminaire or the new RS PRO DL 150/DL 200 downlights for recessed ceiling installation.
The savings potential is enormous: Replacing one fluorescent tube alone lowers electricity costs per luminaire per year from € 210.90 to € 9.99. This means savings of over € 200 euros per luminaire per year. This is another reason why a new system will have already paid for itself in less than two years in most cases. But an intelligent lighting system not only makes a difference in terms of costs, but also in terms of its carbon footprint: CO_2 emissions are lowered by up to 95 %. And after just 40 days, the CO_2 generated during production is balanced out again. The ban is therefore far more of a step towards future-proof lighting – sustainable and efficient.



5100 series



R series

Downlight

Overview of benefits

State-of-the-art technology, simple conversion, financial benefits

1. Technical benefits

- Intelligent, state-of-the-art technology
- Guaranteed compatibility between lamp and luminaire
- Predictable illumination level and light quality
- Durability thanks to coordinated products
- High availability

2. Conversion benefits

- Existing holes can be used
- Easy commissioning with free app
- Low maintenance
- Fewer products used thanks to better luminous efficacy
- Intelligent control via app

3. Financial benefits

- Maximum savings by combining sensor technology and LED
- Return on Investment (ROI) in under two years
- Funding: 15 % within the framework of Federal funding for luminaires
- Preservation of guarantee and warranty claims

Best Practice

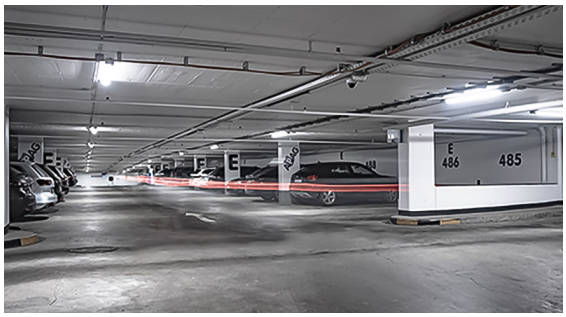
What does this look like in practice?

Energy used efficiently: Eurogress multi-storey car park in Aachen

Mornings, afternoons or evenings: The occupancy rate of the Eurogress multi-storey car park in Aachen varies. After all, the events held nearby take place at different times – some during the week, others at the weekend. The previous lighting solution featured T5 fluorescent tubes that shone 24 hours a day. According to Simon Papayianni, Managing Director of Aachener Parkhaus GmbH, which operates the Eurogress multi-storey car park, this poses two problems at once: On the one hand, it goes without saying that the system is not very efficient, yet the light is also not high quality.

In view of rising energy prices, but also with a view to lighting, the municipal company felt compelled to act. They therefore commissioned their building services provider, gevetec GmbH, to renew the lighting. But was it merely a case of replacing the lights? This did not go far enough for the electrical experts based in Würselen. A new system was needed. "We opted for STEINEL's lighting solution because we believe it is the best technical and most modern solution on the market," says gevetec Managing Director Dirk Schauer, and he has taken action.

The STEINEL solution comprising the 5100 series essentially consists of two components: sensor-controlled lights and networking via Bluetooth. "The solution allows us to divide the parking area into several zones," says Tobias Hönerbach, field service employee at STEINEL. As such, the entire parking area no longer needs to be permanently illuminated: If a car drives into a zone that is only set to basic light, the motion sensors detect this and switch the lighting to 100 %. Once the car leaves this zone again, the next zone is activated, while the previous one is switched back to basic light. Detection radius, light intensity and run-on times can be conveniently controlled via a smartphone app. Gone are the days of group switching via hardware. Gone are the days when tradesmen had to climb ladders to rewire systems. And gone are the days when the lights shone 24 hours a day – no matter what event was taking place at the Eurogress.



422

installed luminaires
from the 5100 series

€ 42,000

savings per year

158,000

kilograms less CO_2
per year in total

More information and the case study video can be found here.

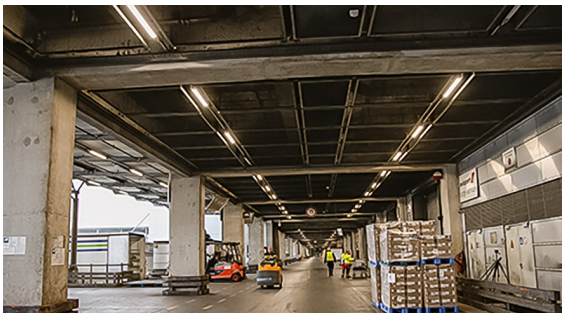
Long-term solution for the cargo area: Franz Josef Strauss Airport in Munich

Whether during the day or at night, the cargo area at Munich's Franz Josef Strauss Airport is always bustling with activity. This makes it all the more important to always keep an eye on the big picture. Light plays a crucial role here; after all, many obstacles and potential dangers lurk in this varied environment. The matter of finding suitable lighting quickly arises.

The cargo area was opened in 1992 alongside the rest of the airport. The lighting was last replaced about ten years ago. The company then switched to T5 technology, which was current at the time. For energy-efficiency reasons, a new replacement is now required. "The aim was to find a long-term, durable and, above all, energy-efficient lighting solution for our cargo area," says Michael Obermaier, an expert in energy management and analysis at Munich Airport.

The sensor-based solution of the STEINEL 5100 series fits the bill perfectly. "It's definitely a long-term solution since the technology allows us to exceed the legal requirements in terms of illuminance. And it's efficient because we can also save energy thanks to the sensor-controlled and presence-controlled light switch-off," explains Obermaier. The key to success lies in the sensor technology and system connectivity: "The fact that every light in the 5100 series has a motion detector and Bluetooth connectivity means we are able to work with very short run-on times," says Anton Riedl from STEINEL Project Sales: "This means that the light is always on when it is actually needed. Basic lighting covers the remaining time."

A total of 1,300 luminaires and a good 200 additional detectors for use at height were installed and wired to the existing electronics. The luminaire system and the sensors were set up, connected and parameterised via a smartphone app. According to its own calculations, the airport can save 230 tonnes of CO_2 every year with the system. And the investment is also having an effect on costs: The energy savings are expected to pay for the lighting installation in under four years.



1,300

installed luminaires
from the 5100 series

€ 130,000

lower energy costs
per year

18,400

trees would have to
absorb the CO_2 that is
now being saved

More information and the case study video can be found here.

Light off, spot on

Connected Lighting in Zurich

Many people dream of being in the limelight for once. For residents living at the ASIG housing cooperative at Rütihof in Zurich-Höngg, this dream comes true every day. Each time they enter the apartment building's stairwell in the dark, the light switches on. Just for them. And exactly where they are right now. This means they're always in the limelight. At least, that's what it feels like.

An intelligent lighting system from STEINEL is responsible for this. This principle is called Connected Lighting. Thanks to sensors and connectivity, the lighting is only activated where it is truly needed. The RS PRO R series, which can be adjusted via app, has four light functions: Basic light, dimmable light, backlight and emergency light. It is the most intelligent and convenient digital sensor luminaire system on the market. The warm white light of the R series creates a pleasant atmosphere. Thanks to swarm intelligence, the light follows people through the building and is the driver behind enormous energy savings. Consumption has been reduced by a total of 95 %.

"Of the 95 % energy saving, 53 % is attributable to the lighting control system and 42 % is down to the efficient LED luminaires. If you extrapolate these figures to all 17 ASIG houses in Rütihof, 26.7 MWh can be saved per year," says Stefan Gasser, Managing Director of eLight GmbH, who is responsible for the measurement in Rütihof. As such, people not only feel they are in the limelight, but they are also saving a lot of energy. This quite literally creates a lot of bright enthusiasm.

99

installed luminaires from the R series and 5100 series

95%

energy saved

26.7 MWh

potential for all 17 ASIG houses

More information and the case study video can be found here.

Thinking about tomorrow today

An intelligent system rather than mere LEDs

Why it is worth foregoing the intermediate step

Investing today results in savings tomorrow. This is especially true in the case of lighting. After all, hardly any other system pays for itself as quickly as a Connected Lighting solution. The potential is correspondingly great. That is why it is advisable to not only consider tomorrow, but also the day after tomorrow when making investments today. In terms of lighting, this means saving the effort of merely upgrading to LED technology and instead opting for Connected Lighting from STEINEL with efficient LED lights, motion sensors and Bluetooth connectivity.

If you save on the intermediate step, you really will save the day after tomorrow. Glancing at the figures makes this clear. Of course, even replacing the light sources by converting to LED luminaires offers savings. The rule is that the greater the output, the greater the savings. If an 18-watt fluorescent tube is replaced by a 10-watt LED tube, this means a saving of about 45 %. For a 58-watt fluorescent tube replaced by a 20-watt LED luminaire, savings then equate to 65 %. But there is also a risk here. If you simply replace the luminaires, you run the risk of still using more light sources than you actually need. As a result, maximum savings are far from being reached.

Only an intelligent solution can unlock the full savings potential. Swarm intelligence using a Bluetooth mesh is the key to success. Motion sensors detect activity and switch on the light when it is needed. And thanks to networking via Bluetooth, only the luminaires that are sufficient for the desired brightness are actually activated.

Price trends and funding

Invest today, profit immediately

It goes without saying that energy savings can already be achieved by changing conventional fluorescent tubes to more efficient LED luminaires. However, the savings effect only becomes really significant when these LED luminaires are also intelligently controlled thanks to Connected Lighting. The following table illustrates how great the potential is to convert efficient LED luminaires to Connected Lighting.

Example based on renovating a Frankfurt underground car park:

Current situation	Conversion	Result
Number of LED lights 670	Number of LED lights 425	**Thanks to good Relux planning, 245 fewer LEDs were required**
kw/h p.a.* 182,472	kw/h p.a.* 43,498	**Energy savings of 76.2 % per year****
CO_2 kg p.a.**** 91,236	CO_2 kg p.a.**** 21,749	**Saving 70 tonnes CO_2 per year**
	Trees ***** 5,600	**The CO_2 savings correspond to the input power of 2,692 trees**
	EURO p.a. -34,744	**Electricity costs-savings per year**
	ROI 3,6	**Years Return on Invest**

*Measured by PROLog STEINEL July 2021
** Run-on time 5 minutes
*** kw/h Euro 0.30
**** 0.5 kg of CO_2 per kWh
***** A beech tree binds around 12.5 kilograms of CO_2 per year.

Energy prices

Invest early, make greater savings

The savings effect will not be greater, but certainly more relevant, if energy prices continue to rise. On average, one megawatt hour cost less than € 50 between 2016 and 2020. A value that should be consigned to the history books once and for all. While the price had already doubled in 2021, it exceeded € 620 per megawatt hour for a short time in 2022. To compare: Our example in the Frankfurt underground car park was based on € 250 for one megawatt hour of electricity. This means that while the energy savings from a smart lighting system will remain unchanged, the absolute costs will make an even bigger difference. Those who invest early therefore make greater savings.[4]

Funding

Financial help from the state

Be it a residential or commercial property, a renovation or new construction project, those who invest in energy efficiency will be rewarded. The German Federal Ministry for Economic Affairs and Climate Protection supports refurbishment measures, as well as newly constructing or converting buildings into efficiency houses through Federal funding for efficient buildings. For example, converting to energy-efficient lighting systems in non-residential buildings is subsidised with a grant of 15 % up to € 33,000, as long as the system luminous efficacy is greater than 120 lm/W and more than 80 % of the luminous flux is preserved after 50,000 hours.

Good to know:

All eligible applicants – including companies, private individuals, municipalities and non-profit institutions – must submit funding applications before starting the project, such as concluding contracts with specialist companies. Moreover, applicants must seek advice from an energy efficiency expert to avoid planning errors. They will also prepare the technical project description, which explains the measure to be applied for.

4 https://www.kopernikus-projekte.de/aktuelles/news/strompreisentwicklung_flexibilitaet

Exploring the lighting of the future

Interview with the Managing Director of the STEINEL Group.

Martin Frechen

Managing Director of the STEINEL Group

What advantages are offered by intelligent lighting systems?

Intelligent lighting systems adapt to users' behaviour. Just like a school of fish, intelligently networked luminaires react to their environment. Building users are always illuminated – no one is left in the dark, no one goes unnoticed. This consumes minimal energy, yet comfort and safety are increased. Using our system, we are able to reduce electricity costs and CO_2 emissions by over 90 %. We have already proven this in many projects across Europe.

What must be considered during conversion?

One of the great advantages of our system is that we build on existing electrical wiring, which is usually still intact. This means that no new cables have to be pulled. This is not only sustainable, but also saves both time and money. This means we are excellently positioned to develop portfolios and, of course, also for new construction. Once our luminaires are connected to the mains voltage, they can be set up via any smartphone or tablet. We are happy to offer support, but in our experience, we don't tend to be needed for long. Setting up the networks and luminaires is very intuitive.

How will light and its importance change in the future?

Light consumes energy and is enormously important for people's well-being. Strictly speaking, it is a scarce resource like water. But we are yet to treat light as such. We waste it because we don't use it as we need it – instead, we just let the lights 'burn'. The lighting systems of tomorrow have sensors and are intelligently networked. They only activate luminaires where people are present and keep them switched off when no one is present. Outdoors, this automatically eliminates a significant proportion of light pollution – what a misnomer from a human perspective. Animals and insects, however, have a different opinion on this matter. Sensor-controlled, networked luminaires only minimally disturb wildlife yet massively reduce unnecessary light emissions. The light of tomorrow is intelligent, sensitive, attentive, considerate and already available now from **STEINEL**.

3 reasons to opt for Connected Lighting

1. Simple commissioning with little installation effort.

Rather than using cables, the luminaires are connected to each other via a Bluetooth mesh, combined into lighting groups and operated via the STEINEL Connect app.
The resulting network is stable and secure. It does not require a central server. Furthermore, the system is very quick and easy for installers to install and manage.

2. Save money and energy without sacrificing anything.

A high sensor density and networking enable intelligent lighting control and provide even more energy savings, efficiency and comfort. The light is always shining exactly how people need it. The luminaires and groups "talk" to each other and act accordingly. This makes STEINEL's luminaire system the most economical and sustainable on the market.

3. Quick payback – both financially and environmentally.

Switching from conventional fluorescent tubes to an intelligent system is doubly noticeable: on your bottom line and on your carbon footprint. The investment has already paid for itself in less than two years. And compared to the previous lighting, CO_2 emissions are reduced by up to 95 %.

Contact us

Do you have questions about our products? Or are you facing a complex task and looking for a smart lighting solution? Then why not arrange a free consultation with one of our experts?

Book an appointment with your personal contact person here

About STEINEL

Ever since it was founded in 1959, STEINEL has steadily grown from a pioneer into a leading driver of technology and innovation in the market segment for sensor-controlled lighting technology, as well as hot air tools and hot glue guns. With its presence and motion detectors, multi-sensors and sensor luminaires, the East-Westphalian company with over 1,800 employees is a world leader in intelligent lighting control and helps to considerably reduce energy consumption. Intelligent building solutions have opened up new areas of application, aside from classic building automation. STEINEL offers products and solutions for consumers and professionals alike. The 'professional line', aimed at planners, architects and installers, offers intelligent products and sophisticated systems for professional requirements. Meanwhile, the 'Home & Garden' range, aimed at consumers, provides high-quality products for increased everyday safety and convenience. The globally renowned, innovative and intelligent products are developed at three in-house development centres and produced in the company's own factories in Europe. Seven sales offices in England, France, Italy, Austria, Romania, Czech Republic and the USA, as well as an extensive network of independent distributors support STEINEL's sales activities in over 70 countries.

Published by STEINEL 2023
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