



# *festive* LIGHT CODE

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Haldenzauber Hückelhoven, Germany

## THE MK FESTIVE LIGHT CODE. A GUIDE TO HELP YOU REDUCE LIGHT POLLUTION.

Festive decorative lighting adds sparkle, optimism, and a splash of joy to the everyday. It reminds us to celebrate life. In delivering our lighting projects across the globe, we've witnessed just how powerful light can be in brightening up peoples' lives, and the positive effects of light on humans is backed by countless studies.

### FOREWORD

SEBASTIAN AUFHAMMER  
HEAD OF INNOVATION  
& TECHNOLOGY  
MK ILLUMINATION



Light can sometimes have the opposite effect, however. Poorly planned and excessive lighting displays can negatively affect people as well as animals, plants, and the natural world that surrounds us.

Here at MK Illumination, our goal is to ensure that our products don't have this effect. Our BUY SMART model is proof of our promise to you that our lighting products are efficient, legal, safe, and now also as sustainable as possible. A sustainable approach relies on many factors, and one of those is quality. We refuse to compromise on the quality of our products, which means that you can rest assured that any motifs that come from us will have a long life. This is important because the highest CO<sub>2</sub> emissions arise during production – long-lasting products mean fewer emissions, and that's good for us all.

We're pleased to announce that our BUY SMART approach now includes a brand new quality factor that focuses exclusively on sustainability. It meets the standards of the first Festive Light Code in the industry, which provides clear guidelines on how to reduce light pollution.

This code was developed in partnership with the Austrian federal state of Tirol, whose environmental ombuds office has been working tirelessly in recent years to reduce and prevent light pollution. On behalf of MK Illumination, we would like to express our sincere gratitude for their openness and scientific contributions to the development of the code. It is with great pride that we introduce you to the world's first Festive Light Code in the next few pages. This code will give you clear guidelines to help you plan your lighting project with sustainability in mind, and how to reduce light pollution in the process. We've kept it simple so that it will be easy to follow and implement these guidelines. As a complete solution provider of festive decorative lighting, we are committed to using this code in the planning and execution of our projects to ensure compliance with the light code, too.

**Together, we can create extraordinary lighting experiences that are good for people and good for the planet.**

*Sustainability is a key value at MK Illumination, and we know that there is always room for improvement in this area. That's why we will continue to evolve our products, processes, and systems until we have a second-to-none approach to sustainability.*



**FOREWORD**  
JOHANNES KOSTENZER,  
ENVIRONMENTAL  
OMBUDS MAN, TIROL



Using artificial lights to illuminate the night has effects on the lives and well-being of plants, animals, and humans alike. As visual creatures, light is vital for humans. At night, light makes people feel safe, helps us find our way, and fills us with strong emotions. Light has been essential in the development of the human race over the millennia.

**The light has no meaning without darkness.**

Where there is light, there must also be shadows. Excessive artificial light in the evening sky has a deadly effect on animals and disturbs the bio-rhythm of both plants and humans. Due to light pollution and

sky glow, humanity is increasingly losing its view of the starry sky, one of the cornerstones in the development of human culture.

Fortunately, it's possible to reduce many of the negative effects of artificial lighting with relative ease by applying a set of simple criteria.

By working in partnership with MK Illumination, we have been able to develop a Light Code to guide the design and implementation of festive lighting so that the influence of artificial light on the landscape, animals, plants, and people is as minimal as possible.

We would like to thank MK Illumination for their constructive cooperation and the in-depth, open discussion around the topic of light pollution. Our work together demonstrates that it's possible to find a balance between enjoying artificial lighting in the outdoors and making time to enjoy nighttime darkness, too.

#### Where are the stars?

Lying in a meadow and gazing up at the starry sky. Far above us are planets, the North Star, the Milky Way, our galaxy! Around 99% of Europeans can't enjoy

these wonders because their nighttime environments are, to varying degrees, lit up by artificial light. Our environment shapes us. It influences how we feel and defines our relationship with our surroundings. Physically, we are made of stardust, and in looking at the starry sky, we are able to see our origins. This is one of the many reasons that the Tirolean Environmental Ombudsman is working to protect the night and make sure that we can all enjoy an undisturbed view of the starry sky. In looking up and seeing the stars and constellations, we can recognize ourselves, be reminded of our history, and have a nightly opportunity to experience the intense connection that we have to the world around us.

# Are we losing our starry sky?

# 01

Humans are losing their view of one of the cornerstones in the development of human culture: the starry sky. And the cause? Light pollution and sky glow.



# Festive Light Code

Sometimes it is difficult to work out if and how planned or existing festive decorative lighting might have a negative impact on the lives of plants, animals, and people.

The level of impact depends on a variety of factors, such as whether the lighting will appear in a shopping street, a residential area, or an uninhabited landscape. The time of year is also important in assessing impact, as is the time of day—or when—the lighting will be visible.

Technical factors, like the type of light source, the color of the light, and any integrated dynamic effects also influence how lighting affects our environment and us. Studies have shown that the level of attraction that insects have to artificial lighting depends on the light source used. LEDs, for example, have been shown to have less impact on the environment than metal-halide lamps.

## 02

### EDITORIAL THE MEANING OF THE FESTIVE LIGHT CODE

Some special outdoor lighting systems like sky projectors have deadly effects on migratory birds. The beam of light has a disorientating effect and the birds orbit around the beam until they die of exhaustion. In terms of the color of lighting, warm-white light spectra tend to be less attractive to animals, birds, and insects than cool or blue light spectra. Our MK Festive Light Code is designed to help you minimize the “attracting” effect and many other aspects of light pollution at the planning stage of your project. As an end-to-end festive lighting provider, MK Illumination follows the MK Festive Light Code, and we encourage you to do the same.

You can find all the essential criteria of the MK Festive Light Code in the following pages. These take the form of practical, easy-to-implement guidelines to help you plan a new project and assess an existing project.



On pages 18-19, you can use our **“Stop-or-Go” self assessment** to see whether your planned or existing lighting installation is Light Code Compliant.

*If you need some help planning your festive lighting or would like to evaluate your existing lighting installation, we would be happy to advise and support you.*

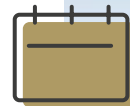
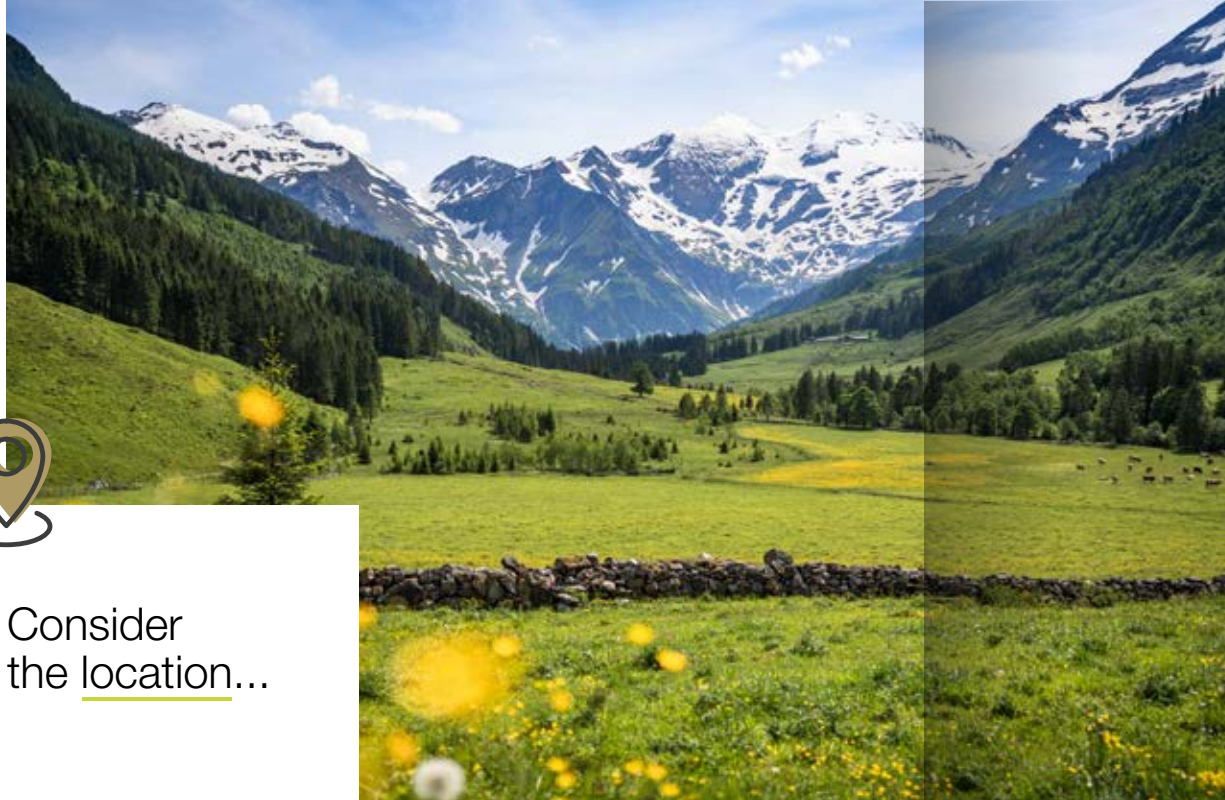
Our MK Festive Light Code gives you clear and simple **guidelines to help you reduce light pollution.**



# 03



Consider the location...



## The Three Key Factors

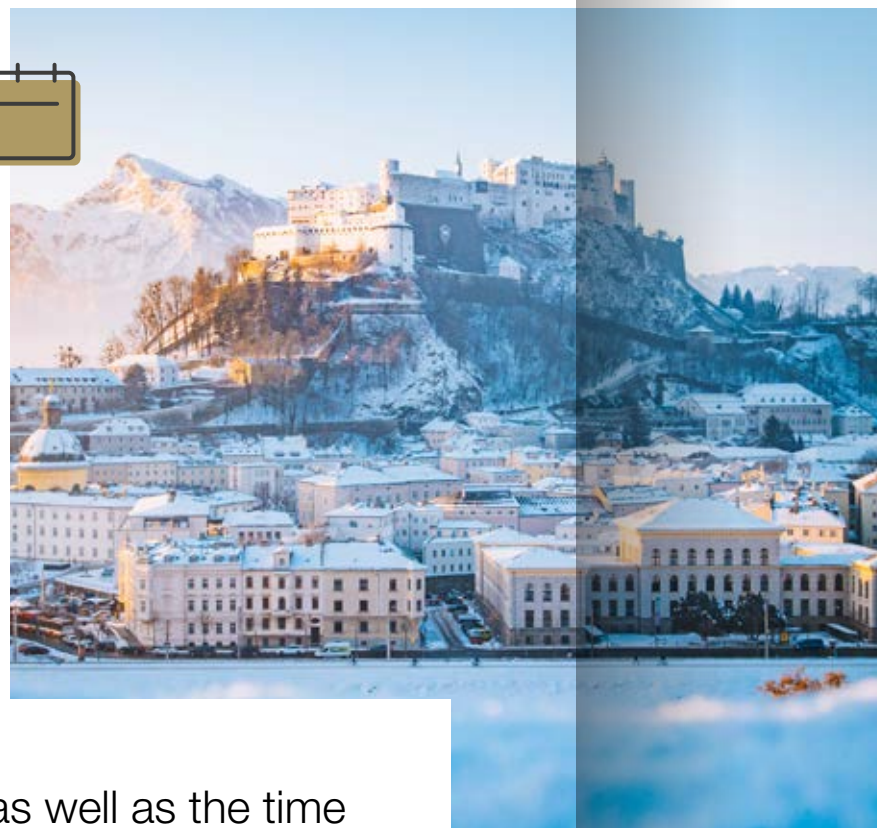
To reduce the negative influences of light pollution, it is essential to think about three key factors when planning a festive lighting concept:

**WHERE** – where are you planning to install the lighting?

**WHEN** – what time of the day and year will the lighting appear?

**HOW** – how will the project be installed and what technology will you use during installation?

Consider the following factors to assess whether your festive lighting reduces light pollution. ➤



...as well as the time of day and year...



...and the technical implementation.







ECOSYSTEMS HAVE VARYING DEGREES OF SENSITIVITY TO THEIR LIGHTING ENVIRONMENT. PEOPLE'S EXPECTATIONS OF THEIR ENVIRONMENT VARY, TOO, ALONG WITH THEIR NEED FOR DARKNESS.



Untouched natural areas.  
Sensitive ecosystems.  
Dark night landscapes.  
Unpopulated cultural landscapes.

Mountains; river landscapes; water sources in natural settings; biotopes; wetlands; coastal regions; primeval forests; deserts; steppes; woods & ponds in natural settings; nature reserves, national parks, light-protected areas, and similar protected areas; land used for agriculture and forestry in permanent settlement areas free of settlements



Loose development in rural areas, residential areas in suburbs and villages, commercial zones/shopping centers mostly surrounded by open land, larger (sub)urban green spaces, city/country transition zones, visitor centers/campsites accessible via public roads within nature parks, etc.

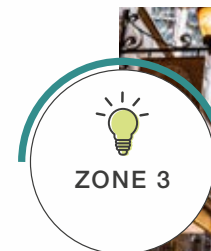
Scattered settlements.  
Settlement outskirts.  
Urban nature islands.

# 04 The Key Factors: Where?



Urban Open Spaces.

Shopping streets, public places, closed urban spaces, continuous closed development in village and town centers within settlement areas, inner city parks, shopping centers, and commercial zones in urban environments



Shopping malls, railway station concourses, airport terminals



Interiors.

# 04 When?



WHEN IT COMES TO FESTIVE LIGHTING, THE TIME OF DAY AND YEAR WHEN THE LIGHTING APPEARS HAS A SIGNIFICANT INFLUENCE ON THE POTENTIAL NEGATIVE EFFECTS OF LIGHT:

## Season

Colder seasons tend to be times of less activity for plants and animals and many forms of life hibernate or reduce their activity to conserve energy. This reduction in activity means that these seasons are less sensitive to disturbances like artificial light. Other times of the year may be more ecologically sensitive, for example, seasons during which animals and birds migrate, mate, or breed.

## Time of day

When periods of natural darkness are interrupted by artificial light, life of all kinds can be negatively affected.

This applies even to very low light intensities. The length of the interrupted periods of natural darkness is important, too. The longer it remains bright, and the more the natural light-dark cycle is disturbed, the more serious the ecological effects on the environment.

Crepuscular and nocturnal plants and animals experience **significant stress** when exposed to **artificial lighting** late into the night.



TECHNICAL,  
TECHNOLOGICAL,  
AND CONCEPTUAL  
LIGHTING FACTORS

## Light sources

(LED, halogen, incandescent, etc.)

Warm-white LEDs and high-pressure sodium vapor lamps have been proven to have the least effects on nature, for example in the attraction behavior of nocturnal insects. Apart from that, light sources with low energy consumption, long lives, and modular exchangeable luminaires result in the highest conservation of resources, energy, and raw materials.

## Light color

Cool/warm (Kelvin)

The spectrum of lighting influences many aspects of light pollution. The blue part of the spectrum tends to attract animals and insects more than warmer light. Blue light shines strongly into the atmosphere and is scattered more than warmer light, resulting in a blue sky on a cloudless day. This means that short-wave or blue light sources are particularly intensive light polluters. Light sources that lose a lot of light, rather than only shining where light is needed are also significant contributors to sky glow.

Blue light disrupts human sleep rhythms by inhibiting the release of melatonin and throwing off the body's biological clock – the circadian rhythm. For these reasons and more, warm light colors are a safer choice.



**IMPORTANT!**

## Dynamic Light Control

Dynamic control elements enable the control of festive lighting, including **dimming lighting at pre-defined hours, changing colors, and initiating partial switch-offs**. By using light products with dynamic control elements in festive lighting projects, especially in sensitive environments, it is possible to significantly reduce the negative effects of artificial lighting on plants, animals, and humans.

## Brightness & luminance

Candela/light per m<sup>2</sup>

The simple rule here is to have as little brightness as possible, especially if shielding is not technically possible.

## Shielding

**Structure of the light sources, the direction of light, exposure of the light points**

To prevent light from scattering into the atmosphere and causing light pollution, it's important to apply the maximum upward shielding possible to lighting elements. For this reason, lighting should not be mounted higher than surrounding buildings and structures.

## Communication

**With and for residents**

A constructive and on-going dialog can help to reduce unintentional disturbances and stress in the community.

# How?



# Light Code Map\*

LIGHT CODE COMPLIANT LIGHTING MUST MEET LOCAL, SPATIAL, TECHNICAL, TIME-SENSITIVE, AND DESIGN REQUIREMENTS.



When?	LIGHTING TIME LIMITS			
	Time of day (winter): 07:00 - 22:00	●	●	●
	Time of day (winter): 07:00 - 23:00		●	●
	24 hours a day			●
LIGHT-SOURCE	LED	●	●	●
	Precise contour projections on facades and paths		● until 22:00	●
	All types of light sources possible			●
BRIGHTNESS	Maximum brightness for 3D motifs without shielding = 10 Candela/m²	●	●	●
	< 30 Candela/m²	●	●	●
	> 30 Candela/m²	● until 20:00	● until 21:00	●
LIGHT COLOR	Warm-white (or warmer)	●	●	●
	Brilliant white (or warmer)	● until 20:00	●	●
	All light colors possible in combination with shielding		● until 21:00	●
	All light colors possible			●
COVER	Top shielding present	●	●	●
	Light object height lower than surrounding buildings and structures	●	●	●
	No shielding		● until 22:00	●
How? PLANNING	Collective project communication	●	●	●
	No restrictions			●

★ The Light Code applies exclusively to festive lighting in winter or during seasons of low ecological activity. All other seasons are significantly more sensitive.

● ● Only with **dynamic lighting control** until the time specified.

05

THE BOTTOM LINE:  
MINIMIZE NEGATIVE EFFECTS ON HUMANS, ANIMALS, AND THE ENVIRONMENT BY ADHERING TO THE FOLLOWING:

**ZONE 0**  
Artificial lighting in unspoiled or ecologically important natural areas, zones of importance for nature conservation, and in truly dark night landscapes **should be avoided**. In addition, unlit areas in permanent settlement areas should be left unlit to give everyone access to an unpolluted, easy-to-see starry sky.

**ZONE 1**  
In scattered settlements, settlement outskirts, and natural islands in urban areas, it is necessary to significantly limit the duration of lighting, particularly during the darkest hours of the night. By using **only LED lights with low luminance** in primarily **warm light colors**, with the best possible **shielding**, it is possible to significantly reduce—and perhaps even altogether avoid—light pollution. By restricting lighting to periods of less activity in the ecosystem, it is also possible to reduce the negative effects of artificial light on migratory birds animals, and humans.

**ZONE 2**  
Urban areas already tend to be well-lit by artificial lighting. Festive lighting in these areas should include an intelligent combination of **dynamic control elements and shutter systems** as this allows for the

use of higher luminance light sources on the colder spectrum. Lighting in urban areas can remain switched on much later into the night than in suburban areas. In inner-city residential areas, it's advisable to ensure a regular and **on-going dialog with residents** to ensure that lighting doesn't cause unnecessary friction or stress.

**ZONE 3**  
Lighting installations that only appear indoors can use any technical features.

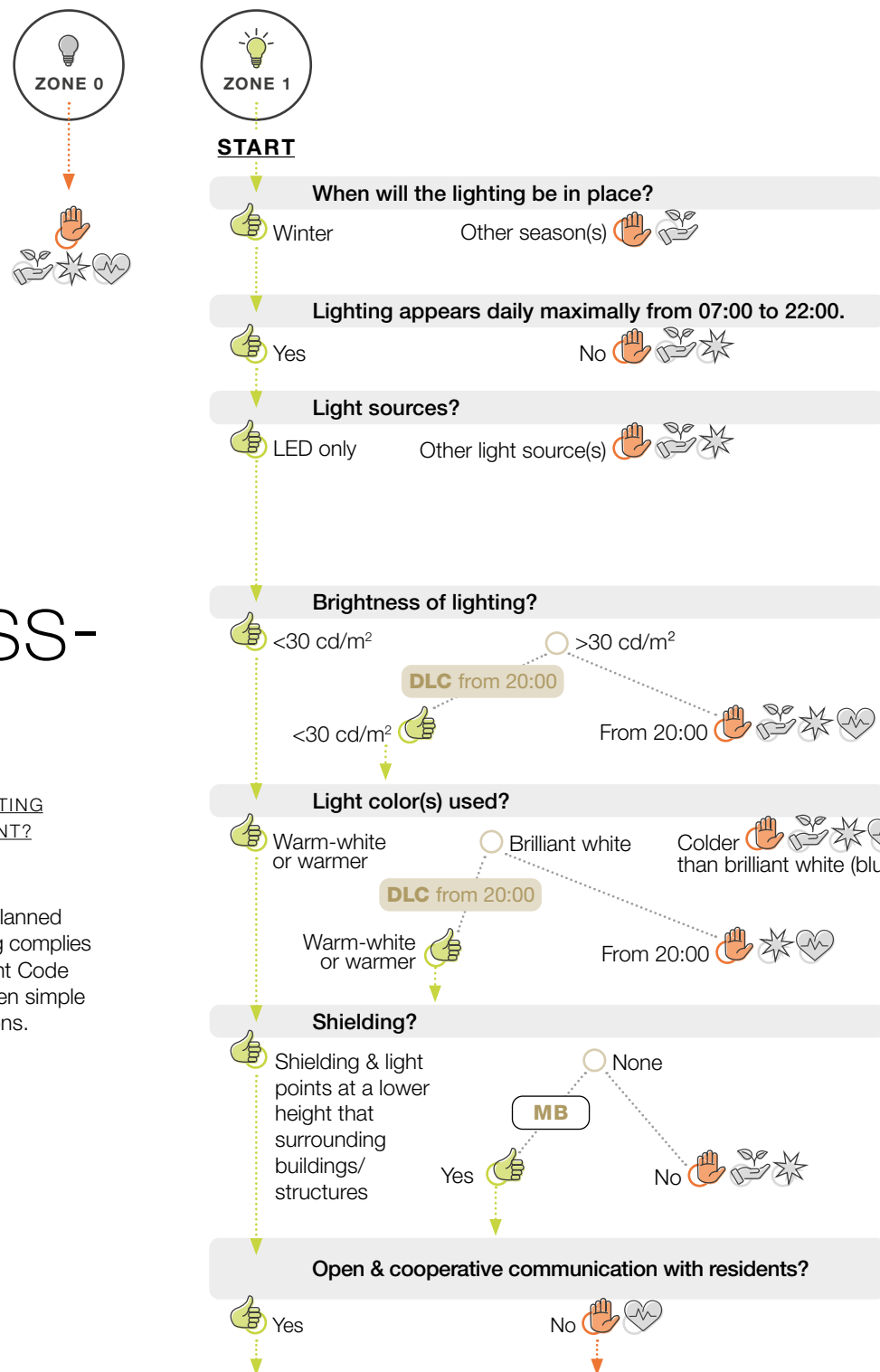
In addition to preventing or significantly reducing light pollution, festive lighting that is environmentally-friendly and sustainable represents a responsible use of energy and resources. Efficient and durable light sources should be used to minimize energy consumption in the production and operation of lighting materials, whilst the thoughtful design of lighting systems allows for the modular replacement of components to repair systems. This reduces the unnecessary disposal of lighting products before the end of their maximum service life.



# Self Assess- ment

IS YOUR FESTIVE LIGHTING  
LIGHT CODE COMPLIANT?

Find out whether your planned  
or existing festive lighting complies  
with the MK Festive Light Code  
by answering these seven simple  
self assessment questions.

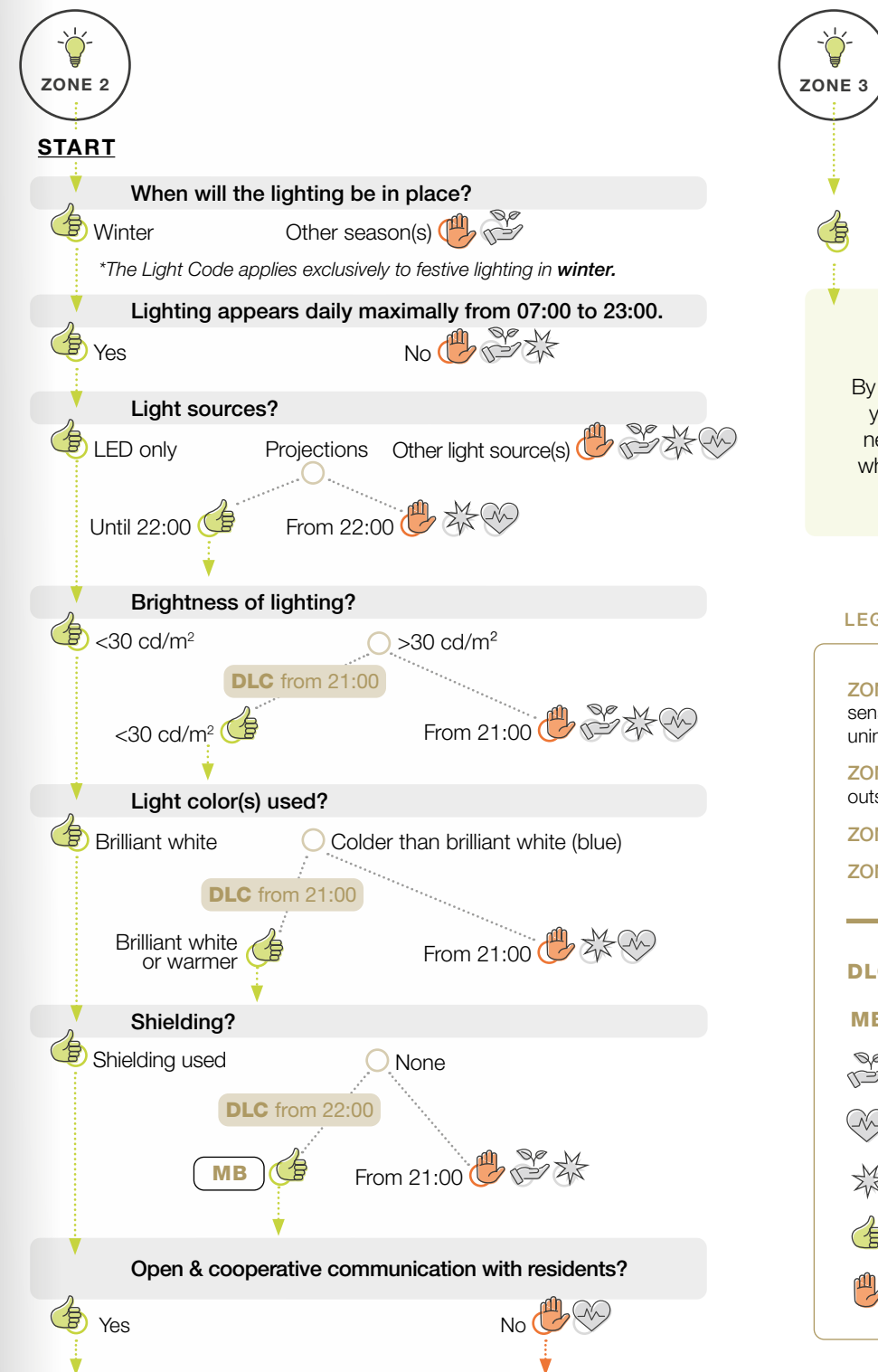


**Your project is  
Light Code compliant.**

Your festive lighting is designed  
to reduce the negative effects of  
light pollution. Congratulations!

**Your festive lighting is not  
Light Code compliant (yet).**

Don't panic. It's often possible to modify  
existing festive lighting concepts to ensure  
that they comply, especially if you are still  
in the planning stages of your project.

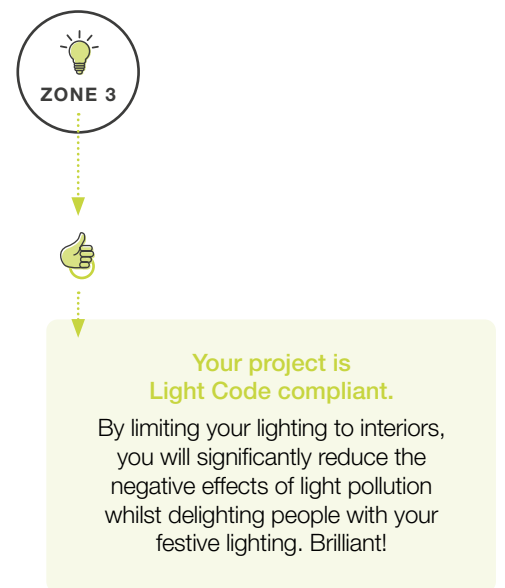


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**Your festive lighting is not  
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Don't panic. It's often possible to modify  
existing festive lighting concepts to ensure  
that they comply, especially if you are still  
in the planning stages of your project.



**Your project is  
Light Code compliant.**

By limiting your lighting to interiors,  
you will significantly reduce the  
negative effects of light pollution  
whilst delighting people with your  
festive lighting. Brilliant!

## LEGEND & ICONS

**ZONE 0:** untouched natural areas,  
sensitive ecosystems, dark night landscapes,  
uninhabited cultural landscapes

**ZONE 1:** scattered settlements, settlement  
outskirts, natural islands in urban areas

**ZONE 2:** urban open spaces

**ZONE 3:** Interiors

**DLC** Dynamic Light Control

**MB** Maximum brightness = 10 cd/m<sup>2</sup>

Ecological Impact

Human Health

Sky Glow

YES! You can go on!

NO! Stop here!



# 07

## Light Code Compliant Product Innovations

Our new “Light Code Approved” light motifs do not emit light directly into the atmosphere. They are also equipped with dynamic lighting control, which allows for the control of time, light color, and brightness. The result? A significant reduction in light pollution.



LIGHT CODE  
20  
FESTIVE



- | a | 620-960 | **Pentor House Aeros** | 95 x 145 x 14 cm | 27 W | 36V | 14 kg | LED LED ● | ☆ | 📱
- | b | 620-962 | **Pentor House Maxim** | 95 x 134 x 14 cm | 30 W | 36V | 12 kg | LED LED ● | ☆ | 📱
- | c | 620-963 | **Pentor House Orion Pole** | 77 x 145 x 14 cm | 27 W | 36V | 24 kg | LED LED ● | ☆ | 📱
- | d | 620-958 | **Lantern Wreath** | 100 x 130 x 44 cm | 12 W | 36V | 22 kg | LED LED ● | ☆ | 📱



FESTIVE  
21  
LIGHT CODE

- | a | 620-959 | **Pegasus Cheer Across-roof** | 320 x 120 x 14 cm | 54 W | 36V | 23 kg | LED LED ● | ☆ | 📱
- | b | 620-957 | **Flake Wings Across** | 505 x 105 x 14 cm | 40 W | 36V | 26 kg | LED LED ● | ☆ | 📱
- | c | 620-961 | **Pentor House Orion** | 77 x 145 x 14 cm | 27 W | 36V | 12 kg | LED LED ● | ☆ | 📱

● Gold powder coated



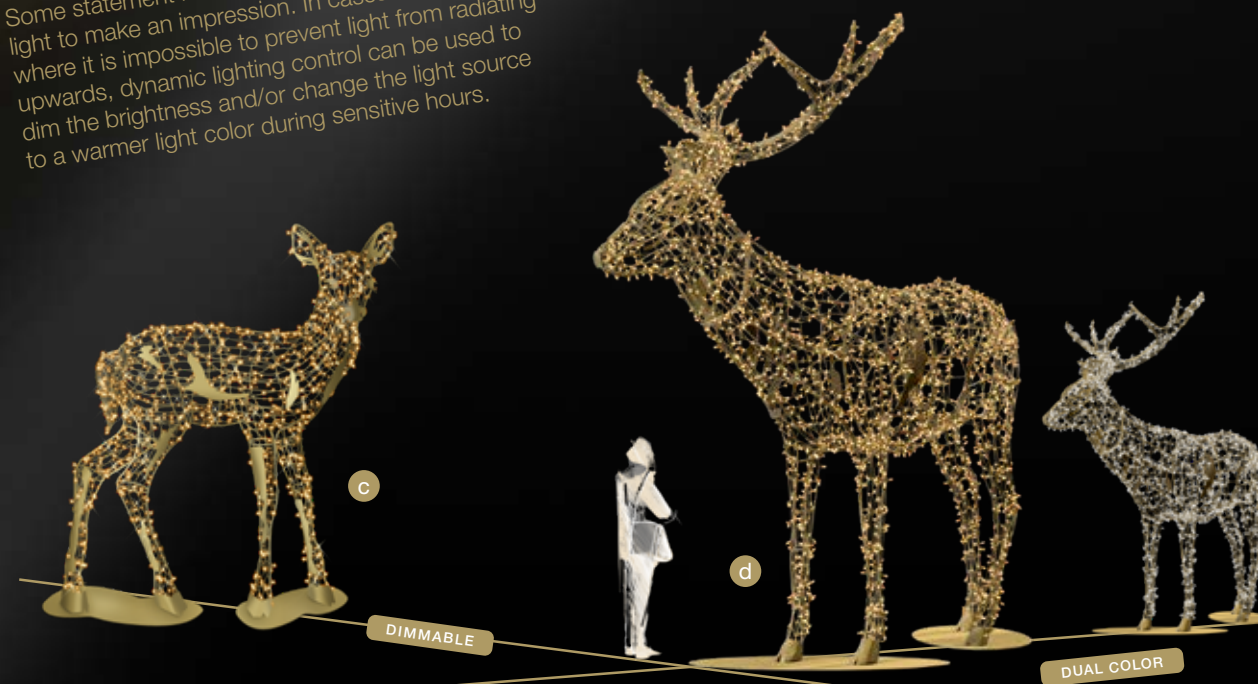


- | a | 620-965 | **Ribbon Pole** | 120 x 110 x 14 cm | 6 W | 36V | 9 kg | LED LED ● | ☆ | 📱
- | b | 620-966 | **Ribbon Rope Pole** | 120 x 110 x 14 cm | 4 W | 36V | 10 kg | LED LED ● | ☆ | 📱
- | c | 620-964 | **Ribbon Across** | 650 x 125 x 14 cm | 26 W | 36V | 28 kg | LED LED ● | ☆ |

● Gold powder coated



Some statement motifs rely on upwards-radiating light to make an impression. In cases like these where it is impossible to prevent light from radiating upwards, dynamic lighting control can be used to dim the brightness and/or change the light source to a warmer light color during sensitive hours.



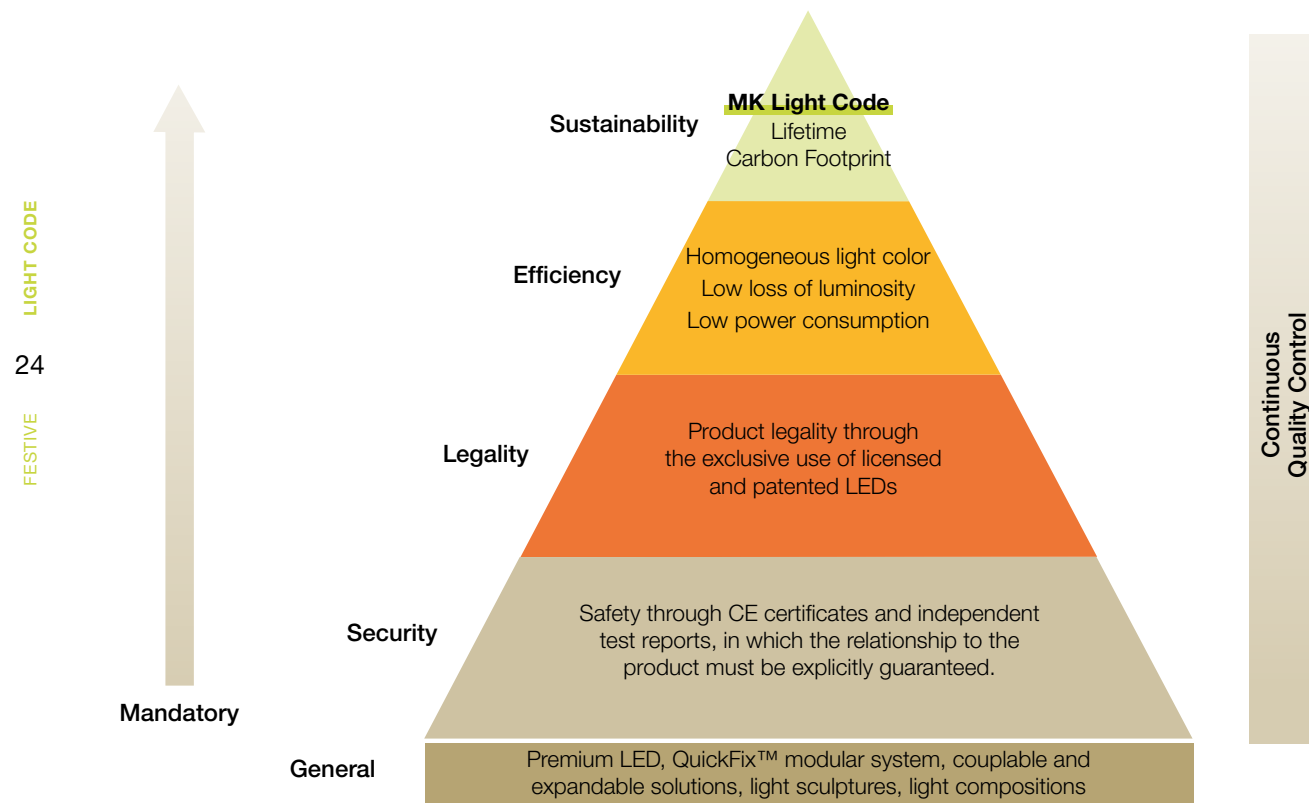
- | a | 620-959 | **Pegasus Cheer Across-Roof Dual Color** | 490 x 520 x 400 cm | 54 W | 36V | 23 kg | LED ● | ☆ | 📱
- | b | 621-118 | **Love Bench Dual Color** | 215 x 188 x 72 cm | 59 W | 36V | 110 kg | LED ● | ☆ | 📱
- | c | 621-119 | **Junior Deer dimmable** | 270 x 320 x 105 cm | 54 W | 36V | 205 kg | LED ● | ☆ | 📱
- | d | 620-450 | **Stag Dual Color** | 500 x 550 x 240 cm | 158 W | 36V | 400 kg | LED ● | ☆ | 📱



# 08 Buy Smart

DECORATIVE LIGHTING WITH  
INCREASED SAFETY AND QUALITY.

BUY SMART from MK Illumination is the first evaluation model for decorative lighting products and motifs. This model helps you to review and evaluate key qualitative aspects when purchasing lighting products. It comprises four levels: **safety, legality, efficiency, and sustainability.**



Sustainable festive lighting relies on products with long lifespans, low energy consumption and a **drastic reduction of light pollution.**

# 09

## What is **light pollution**?

**LIGHT IN THE WRONG PLACE  
AT THE WRONG TIME.**

**Light pollution** is the excessive or obtrusive use of artificial light in (usually) outdoor areas. It disrupts the natural light conditions at dusk and night and has negative effects on human health and the environment.

As recently as 200 years ago, artificial light was made up of open fires, candles, and oil lamps. Thanks to technological advances and the establishment of a comprehensive electricity network in industrialized regions since the 19th century, the sources of artificial light have increased significantly.

Contemporary studies point to a rapid increase in light pollution, both in terms of an increase of brightness or luminosity AND in the area being illuminated. Depending on the location, the brightness of the night sky is increasing by 2-6% annually.

### IMPACTS OF LIGHT POLLUTION

#### **BRIGHTENING THE ENVIRONMENT**

Since life began on earth, all living things have been exposed to the change between day and night. Animals, humans, and plants have adapted their behaviors to this circadian rhythm that, coupled with the seasonal changes in the length of day and night, provides important information essential for survival. **Altering phases of natural darkness with artificial light has consequences for all life that depends on the day-night cycle** – and all life DOES depend on it. The more that the natural light-dark rhythm is disrupted (in other words, the more that artificial light displaces natural darkness), the more significant the ecological effects.

In addition to negatively affecting physiological processes like growth and flowering in spring and summer, or leaf shedding in autumn, light pollution also changes the behavior of organisms. This results in the attraction, displacement or loss of orientation of moths, birds, bats, and other flying creatures, as well as aquatic animals and many other living creatures. The ecological effects of light pollution range from the displacement of species within biotic communities to the extinction of isolated populations, especially of sedentary, specialized, and/or endangered species.

#### **SKY GLOW AND LIGHT SMOG**

Darkness is an integral part of life on earth. The night sky is filled with magic and the lack of light results in mysterious landscapes that have a unique character and identity. The undisturbed view of nighttime phenomena enhances the perception of hearing and smell, and for centuries has aided navigation, too.

**Sky glow diminishes the beauty of a star-filled sky,** negatively affects the behavior of living creatures, and reduces the experience of the night for all.

Humankind's relationship with nature and the environment is reduced by light pollution, too. Since the beginning of recorded history, and certainly long before that, humankind observed the constellations and the changes in the night sky to determine the time, seasons, and the best times to plant and harvest crops. The constellations were also used in seasonal and annual human traditions, and much of this knowledge is still used today. Light smog, which envelops cities and regions at night, causes most stars that are visible to the naked eye to disappear. For example, 3000 to 4000 stars can be observed in a dark night sky, but barely 100 can be seen at night in a brightly-lit city.

Studies indicate that 83% of the world's population, and 99% of Europeans and people in the US, live beneath light-polluted skies. The same studies suggest that **a third of the world now cannot see the Milky Way**, which causes problems for astronomers, too. And if that's not bad enough, large cities create a sky glow that is visible at a distance of up to 160 km.

#### **HUMAN HEALTH**

People in highly developed countries spend far more than half of their lifetime inside buildings and have little exposure to sunlight. At the same time they are exposed to artificial light in the evening and night hours, both outdoors and at home. This imbalance has a **negative influence on the day-night or circadian rhythms**, which are linked to the body's internal clock and humans' sleep/wake cycle.

The functions of our bodies are controlled by the hormone melatonin, which is released during the dark evening and night hours. Daylight inhibits the synthesis of melatonin in that same way as artificial light does at night in the short wavelength range. This lengthens the day and reduces our night and hours of sleep. This can result in sleep deprivation, which is a known-source of a variety of health problems.

Sky glow over Innsbruck

IMPACTS OF  
LIGHT POLLUTION



a

THE “**PLIGHT WITH LIGHT**”  
 (“HELLE NOT”) PROJECT IS AN  
 INITIATIVE OF THE TIROLEAN  
 ENVIRONMENTAL OMBUDSMAN TO:

- / raise awareness about the causes of light pollution
- / inform people about the effects of the incorrect use of light
- / inform people of how to reduce light pollution and glare

[www.plightwithlight.org](http://www.plightwithlight.org)

In 1999, the Tirolean Environmental Ombuds Office and the Tirolean State Museums started collaborating on the prudent use of artificial light at night – originally with the idea of saving some of the millions of nocturnal insects that die a pointless death because of artificial light.

Over the years, other important perspectives have been added, such as the negative health effects of light pollution. Fruitful cooperation has been established with partners from various disciplines like astronomy, medicine, environmental protection, and nature conservation in Austria and Europe.



b

An adequate amount of darkness enables healthy sleep

a

Insects fatally attracted to artificial light

b

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[www.hellenot.org](http://www.hellenot.org)

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