

# LIGHTING IN URBAN DEVELOPMENT

**LUCIA**

LIGHTING THE BALTIC SEA REGION

LUCIA Consortium  
[www.lucia-project.eu](http://www.lucia-project.eu)

LUCIA is a European project working to help municipalities in the Baltic Sea region to unlock the potential of energy efficient urban lighting solutions.

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## AIMS TO INSPIRE

Are you working as an urban planner or lighting planner, or do you in some way make decisions on lighting projects in the city? Then this booklet is for you. It aims to inspire planners and decision-makers to work with and integrate intelligent lighting in cities, for the benefit of citizens and urban life.

Light will inarguably be a part of the modern sustainable city. So why not use the existing infrastructure to make the city smarter, and even more sustainable? We would argue that many urban planners would see this as a meaningful development, the question is how to do it?

In this booklet, we look at the integration of the lighting infrastructure early in the planning process, and how to let it act as core infrastructure for integrating intelligent LED-solutions, and by that create a more sustainable and connected city. Such infrastructure has the potential to integrate not only lighting, but all sectors involved in running a sustainable city.

The booklet presents a range of cases from around the Baltic Sea Region, all working with intelligent lighting in urban space in different ways. It builds on experience and knowledge from partnering cities in the LUCIA project and covers topics ranging from strategic goals of lighting over data based smart technologies and circular economy to culture and citizen involvement.



Tunnel in Lund

# STRATEGY AND GOALS

There is a need for a more sustainable and holistic approach to the European and national strategies for urban development. Intelligent lighting should play an important role in this development. By suggesting goals on lighting in the municipal strategy a city can affect political agendas and budgets and thus the overall urban planning. Even though culture and context differ across cities and countries, some urban planning documents are similar across Europe. This includes national and regional guidelines, municipal plans, development strategies, sector plans, area plans, project plans etc. They can differ in content and not all cities have all the above.

There can be a long way from including lighting in official political documents to lighting strategies being implemented, especially when politics, budgets, and the daily operations in a city are at stake. However, including urban lighting parameters in the official plans will make it more likely for it to be prioritized and accepted as an important factor to reach more overall urban goals and strategies. Including goals for public lighting in the urban development strategy requires prioritization. If the municipality incorporates goals of intelligent lighting infrastructure it can contribute to some of the broader goals for the city.

There are examples on goals where the future with an intelligent lighting system can create new opportunities as well as examples where planning for intelligent lighting can benefit from interaction with other sectors in the city.

Lighting can be used to reach a goal or be the actual goal. The following list gives some examples on types of goals that can be reached by modern lighting. The more specific, measurable and realistic the goals are, the easier for the city to follow the progress:

- Increase traffic security and safety
- Increase accessibility and strengthen connections
- Increase lighting quality
- Increase energy- and operational efficiency
- Sustainability through circular investment and business models
- Implementing green lighting technology and minimizing the environmental footprint
- Intelligent lighting generates data for the city to provide better services for the citizens in the Smart City
- Create attractive urban environments and equal access for all citizens
- Avoid light pollution and keep dark areas

## PLANNING FOR INTELLIGENT LIGHTING

**WHAT:** Albertslund in Denmark integrated a strategic lighting plan in their municipal plan. It includes implementation of 100% LED solutions and is based on broader urban goals such as sustainability, innovation, using the city as a laboratory, and citizen involvement. The long term strategy is the core of the renewal of lighting solutions in the city.

**WHY:** When Albertslund made their first lighting plan in 2006 they had realized that the quality of light, including design and energy consumption, and their goal of being a sustainable frontrunner city did not measure up.

**HOW:** Albertslund took many detours in the process towards implementing LED lighting in the municipality, to influence the development and getting the best lighting for the city. They used the city as a laboratory, facilitating triple-helix collaborations, resulting in better and more sustainable solutions. Among other things, the municipality bought back the lighting infrastructure from the energy company and renewed the lighting on public roads and paths. They established public-private partnerships to develop new luminaires and created DOLL Living Lab for outdoor lighting. Lighting was first integrated in the municipal plan in 2009 and in 2014 Albertslund launched their Smart City strategy with intelligent lighting systems as core infrastructure in the city.

**LEARN MORE:** [www.belysning.albertslund.dk](http://www.belysning.albertslund.dk), [www.doll-livinglab.com](http://www.doll-livinglab.com), [www.lightingmetropolis.com](http://www.lightingmetropolis.com)



Photo: Daniel Fogh, Albertslund

## EMPHASIZING LOCAL IDENTITY

Urban lighting allows for urban spaces to be used and enjoyed at all hours. It can contribute to a lively city and to inhabitants' feeling of safety in the streets and other public spaces.

Lighting can also have a major impact on a city's visual identity, especially in the dark hours. It can create a special atmosphere depending on the characteristics of light, such as temperature, colour, intensity and so on, giving cities or urban spaces a distinct local identity. Light can bring attention to specific features of a city, such as characteristic architecture, sites of cultural heritage or other important features or functions of the physical city.

Implementation of smart and energy efficient lighting can contribute to safer and more attractive urban spaces, and it can support a city's identity as a sustainable and smart city, taking in new technologies to enhance the life of citizens and visitors.

This way, lighting can emphasize both physical and strategic features that differentiate a city or urban spaces from others, creating places with strong local identity, and attract visitors and future inhabitants. It is important to keep in mind that the use of lighting to emphasize identity for urban spaces needs thorough planning to avoid light pollution and increased energy consumption.





## LIGHTING SUPPORTS LOCAL HERITAGE

**WHAT:** Porvoo is a medieval town in the South of Finland. Along the riverside in the centre of the city is a stretch of old wooden houses. They are both local heritage and a main tourist attraction. The row of old sheds by the river is one of the most important features in the cityscape of Porvoo. The city wants to shed light on the houses, making them visible at night-time.

**WHY:** The many hours of darkness limit tourists from exploring the local heritage. Lighting the riverside houses gently, and with respect for the original characteristics, extends the hours in which tourists and locals can visit and enjoy the site.

**HOW:** The local heritage should not be compromised, and it was not an easy decision whether to put up light or not at the riverfront. The solution has been to install one luminaire at each house in a warm colour temperature. In this case the new lighting solution fulfilled goals related to tourism and local heritage, as well as the goal of energy efficiency. The lights are dimmed at daylight and lights up more brightly when it is dark, emphasizing the characteristic facades. The project was carried out based on cooperation between different departments in the municipality, the resident association, and the energy company, and it is co-financed by the residents. The project was decided on the strategic level and was then implemented and not included in other planning documents.



# CIRCULAR LIGHTING

Circular economy is a highly relevant aspect to consider when planning for smart lighting. It is a concept, where reuse, repair, recycle and recover are taken into account in all parts of a process. Both when handling old luminaires and lampposts and when setting demands for the new solutions.

In terms of the planning process, thoughts on circular economy should be introduced in the early stages, where goals are set, strategies are thought out and political commitment is made. Setting demands for circularity can influence the design of products as well as the production processes. It can also reduce the use of new raw materials and yield a higher degree of reuse. This way, less waste is produced as valuable resources are kept in circulation.

Before getting started, the municipality should consider Life Cycle Assessment (LCA) as a method for measuring the total environmental impact of a product, from raw materials to manufacturing, procurement, distribution, use, maintenance, and disposal. A circular mindset ensures that lighting becomes a long-term investment and planning tool. Municipalities can include circular economy in the procurement process. Some aspects are covered in the EU Green Public Procurement criteria.

New business models are introduced, where products are designed to last for a long time and can be repaired or upgraded if needed. There are

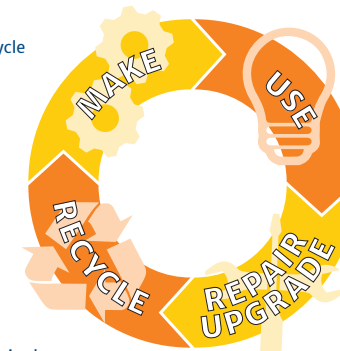
examples of business models where manufacturers take down faulty luminaires, repair them and replace them on a day-to-day basis. Today most outdoor lighting is owned by a city or utility company. The future might bring an expansion of other business models where light becomes a service instead of a product. Business models such as pay-per-lux and leasing are examples of light-as-a-service models. These types of business models can enforce a circular mindset.

## DFE – DESIGN FOR ENVIRONMENT

- Environmentally friendly
- Easy to repair, upgrade, recycle

## HIGH QUALITY COMPONENTS

- Long life cycle
- Low impact



Get 30% of the original value back, (working or broken)

## RESOURCE RECOVERY

- Any part that cannot be repaired is recycled

## ADAPTABLE COMPONENTS

- Send it back for repair or fix it yourself

## RECYCLING SCARCE RESOURCES



Photo: Ecoservice, St. Petersburg

**WHAT:** The energy company in St. Petersburg in Russia, Lensvet, controls and maintains the lighting in the city. In 2019, around 20% of these were LED lights. Over the next decade, Lensvet will change all outdoor lighting in the city and suburbs of St. Petersburg to LED. Replacing all the old lamps, means a lot of waste. At this moment many of the existing lamps contain mercury (sodium or sodium lamps), which is a scarce resource.

**WHY:** The city of St. Petersburg spends a large amount of money on electricity for lighting. With 20% of lighting in the area replaced by LED, the city has already cut the costs for lighting considerably. Money, which the city can now spend elsewhere. Changing the lighting in a big city like St. Petersburg generates a lot of left-over materials, which must be dealt with in a sustainable manner.

**HOW:** Lensvet has received funding from the city budget to replace the old lamps with more environmentally friendly LED lighting. The old lamps are handed over to a licensed organization for the disposal and recovery of valuable components. The organization also accepts old mercury lamps from citizens, mercury medical thermometers and other mercury devices, as well as batteries and small-sized accumulators. This way, waste is minimized, and scarce resources can be reused.

**LEARN MORE:** [www.gov.spb.ru/gov/otrasl/blago/priem-ot-naseleniya-bytovyh-opasnyh-othodov/](http://www.gov.spb.ru/gov/otrasl/blago/priem-ot-naseleniya-bytovyh-opasnyh-othodov/)

# THE SMART CITY – BUILT ON LIGHTING INFRASTRUCTURE

It is a fact that cities need lighting infrastructure. In the same way, as cities plan for physical roads, public spaces, communication networks, sewage systems etc., lighting needs planning. And for a city to become smart, we need to plan for it. For a smart city to function as intended, it needs a bearing infrastructure. The infrastructure must be well distributed and fine-grained, to ensure stable connection across the city.

Lighting infrastructure runs all around the city and already holds a key element for running smart technology – electricity. Thus, lighting infrastructure has great potential to be the bearing infrastructure on which a network of smart technology can be built. The smart technologies, such as sensors and cameras, can easily be connected to the already existing poles and masts – physical elements that is needed for the implementation of smart technologies.

If the lighting infrastructure will be the bearing infrastructure on which a network of smart technology is build, it is important to have it planned in an early phase. Not least to consider the fiber-optic infrastructure. If this is the case, lighting can become one of the cornerstones in planning for the Smart City. In the early stages of implementing smart city technologies, the solutions in connection with the lamppost were not very attractive from a visual point of view. The lighting industry has been developing on both the technical and the visual aspects, and cities are now able to get more attractive solutions.



# LIGHTING WITH MOTION SENSORS

**WHAT:** On a street in Jurmala in Latvia, motion sensors enable the streetlight to be dimmed or lit up, depending on the activity in the street. On the lighting poles, a C-NODE monitor and control device have been installed. The sensors can detect motorists, cyclists, and pedestrians.

**WHY:** The city saw a need to improve the energy efficiency and to test new solutions. The smart lighting system was installed and tested to see the effects on physical safety, sense of security and energy savings.

**HOW:** The motion sensors were the first test of its kind and their utilization for lighting done in Latvia. It was carried out by Jurmala City Council and Lighting Company in 2018–2019. The outcome of the project showed great energy savings and received positive feedback from the users of the street.

Jurmala City Council and Lighting Company gained knowledge about motion sensors as well as experience with practical experience deploying them. One of the key takeaways from the test project was that it is important to be aware that the sensors can fail due to interference from trees, automatic gates, and bad weather conditions. These are all factors that can impact the radiofrequency availability, and therefore must be taken into account when planning for dynamic lighting controlled by motion sensors.



# TECHNOLOGY AND DATA

It has been estimated that two thirds of the world's population will live in cities by 2050. This development will put pressure on the cities, their infrastructure, and resources. With a Smart City mindset, the city can organise itself, maximising the utilisation of space and resources, so they can be enjoyed by the larger number of inhabitants in the future.

One way, that the smart city mindset can be incorporated in urban development and operation is by using data. But there are many elements that the city needs to consider. This includes data ownership, access to data infrastructure, data storage, choice of network and much more. Intelligent lighting alone generates a lot of data, and these data are used in both operation and maintenance. Combining lighting data with for example weather data, traffic data or data about usage of city facilities has the potential of improving planning and liveability.



- At city administration level, it is important to own your data and make sure data storage fulfils the public sector demands. Otherwise, there can be obstacles in using the data and obtaining the data security.
- The data infrastructure should be open, with the possibility to import and export the data from/to the system.
- Have all the data collected in a single data hub, in order to combine and use data for both analysis and solutions.
- Many of the city platforms provided on the market to visualise and combine real-time data are often used in megacities in the USA and Asia, but they can be expensive and require advanced skills. Ensure you choose a solution that fits the size of the municipality, and look for cooperation on a regional level.
- Choose the right network for your solution (eg. ethernet, bluetooth, mobile technology (2G/3G/4G), 5G, Wi-Fi, broadband, narrowband, LoRaWan, Sigfox). You don't need one network to cover it all.

## WHAT ABOUT THE DATA?

**WHAT:** Smart street systems are developing fast in Tallinn in Estonia. Tallinn started by implementing a demonstration street with intelligent lighting and a smart street system. The system gathers real-time data that shows how the road traffic and the pedestrians move.

**WHY:** The company Eliko has developed the demonstration street to show how modern street lighting infrastructure can be used to gather data on the urban activity and environment. It is a part of the overall strategy for Tallinn supporting innovation and Smart City.

**HOW:** The street is equipped with LED lights and Eliko's SmartELI system. The lights are connected through a mesh network, and since the network has a higher throughput than necessary for LED-lights, sensors can be integrated into the network. The sensors collect information about the street's electricity consumption, noise- and traffic levels and garbage level in the waste bins. The City of Tallinn has as a long-term strategy of being a testing ground for new innovative solutions and several intelligent city solutions have already been demonstrated. The approach "Think global, Test in Tallinn" is being used in the Tallinnovation concept to develop Tallinn into a Smart City.

**LEARN MORE:** [www.tallinn.ee/eng/tallinnovations/Smart-Street-Systems](http://www.tallinn.ee/eng/tallinnovations/Smart-Street-Systems)



# URBAN PLANNING

When working with the integration of smart lighting in urban planning, there is a set of points that is recommended to address.

First, include lighting in a holistic and political approach to goals and strategies for the city. Some cities integrate a lighting strategy in their climate plan, some in the physical municipal plan and others as the first chapter of a specific sector plan on lighting as the stepping stone to convert the city lighting into LED and connected lighting.

Second, integrate lighting in the physical plans with guidelines and regulations. Regulations can cover what kind of lighting should be planned for each neighbourhood and, for example, how to avoid glare and light pollution. Guidelines could cover the role of lighting and its characteristics in the different parts of the city, whether the design of luminaires are important due to heritage, due to a special design strategy, due to energy savings etc.

Third, the role of the lighting plans, including processes, cooperation and co-creation elements must be addressed. Legally there will normally be demands on physical plans, like the municipal plan, and the area plan require different permits, while lighting plans will not be mandatory. This is to ensure the quality of lighting for the people living in, and using the

city, and making sure the commitment last to, and beyond, the implementation phase.

Fourth, the technical aspects of smart lighting must be considered. These aspects might influence or be influenced by other sectors of the city. For example, if fiber should be part of the installation to use the smart lighting, in connection with other city infrastructure and therefore power should also be on when lighting is turned off. In that case it should be coordinated with other infrastructure in the ground. Another example, if power is turned on the poles can be connected with charging for electrical vehicles, and the sensors for lighting management can be part of the overall maintenance program. Finally, the long-term budgets prioritised for outdoor lighting must be cleared. Of course, the financing highly depends on what level of new installations is needed. Is it a totally renovated lighting system with new power installation, poles, luminaires and management system, or does the project only cover change of the luminaires to LED? The [LUCIA economic assessment tool](#) can be a helpful tool.





## EXPLORING PLANNING AND GPP

**WHAT:** Riga Planning Region have made an extensive overview of the plans that impact, or is a part of their lighting planning. It describes how municipalities have used the plans to integrate better lighting in their specific areas, and what the benefits have been. Their work also points to main reasons for why lighting is usually not integrated in the plans and recommendations on how to integrate lighting in the future. The report also touches upon Green Public Procurement (GPP) and provides examples on how it has been applied, including barriers and recommendations for how to use GPP.

**WHY:** Riga Planning Region is responsible for development planning on a regional level. Their plans and strategies set the direction for municipalities. In the role of supporting local authorities towards more sustainable cities, knowledge on current status and barriers qualify recommendations.

**HOW:** The report has been carried out as a desktop study as well as through interviews with the lighting managers and city planners in the municipalities. Next step is to inspire the local municipalities to include lighting in the physical planning and to work more actively on green public procurement.

**LEARN MORE:** [www.rpr.gov.lv/lucia-rezultati/](http://www.rpr.gov.lv/lucia-rezultati/) and [https://rpr.gov.lv/wp-content/uploads/2020/02/Lucia\\_Summary\\_Report\\_-EN.pdf](https://rpr.gov.lv/wp-content/uploads/2020/02/Lucia_Summary_Report_-EN.pdf)



Modern street lighting systems at Mārupe

# LIGHTING MASTER PLANS

Making the specific scope for the process depends on the city structures as well as cooperation traditions in the country and city. One of the tools in the early process is the lighting master plan.

Since a lighting plan would normally be initiated by the city without being a legal obligation, the form and content varies a great deal. Many cities around the world have been creating and implementing urban lighting master plans with some general characteristics.

The master plan comes into play at the early stages in renewing the city-lighting, and the work on shaping the master plan involves multiple stakeholders both inside and outside the departments in the municipalities, not least politicians and citizens.

It delivers an analysis of the existing situation for the city and its infrastructure, including characteristics of neighbourhoods and urban spaces and aspects of how people are using the city. In that analysis the structure of roads, paths and spaces are characterised.

Following the strategy and analysis, the future lighting needs to be defined – both on the overall technical specifications and on the design, as well as for the city as a whole and for each type of road and path and maybe for each neighborhood.

Some cities add recommendations on other lightsources in the city, not run by the municipality, such as shops, parking lots and housing.

Co-creation between departments and with the citizens add great value to the lighting planning. [Get inspired on co-creation from the LUCIA work.](#)



Lighting plan, Copenhagen

# FROM TECHNICAL SPECIFICATIONS TO HOLISTIC PLANNING



A new working process for light planning includes place-specific conditions and considerations as well as participatory and interdisciplinary processes in an iterative flow, where people and conditions simultaneously affect and is affected by the outcomes.

**WHAT:** A new working process for urban lighting was developed and put into administrative and political guidelines in Gothenburg in 2018. Before, the process was to go directly from the overall lighting plan and technical requirements to project design and implementation. Post implementation of the new working process, a new phase of cooperation on light-planning and involvement in the early stages of the city planning are included.

**WHY:** Gothenburg has an overall vision to be a sustainable city, open to the world. Lighting plays an important role in creating the sustainable city and can be a tool to achieve sustainability goals as well as connecting functions to reach both social, economic, environmental and cultural sustainability.

**HOW:** The first step was to acknowledge that the past approach on lighting projects were too sector specific. To change the approach a co-creation process on making a new process was carried out with the different departments in the municipality playing a role in shaping the city. Light planning was then established as a formalised process, where the important factors shaping the urban space are included: identity, social, biological, spatial and technical.

**LEARN MORE:** [www.goteborg.se/wps/portal/start/byggande--lantmaterioch-planarbete/kommunens-planarbete/verktyg-for-stadsplanering-2/goteborgs-stadsmiljopolicy](http://www.goteborg.se/wps/portal/start/byggande--lantmaterioch-planarbete/kommunens-planarbete/verktyg-for-stadsplanering-2/goteborgs-stadsmiljopolicy)

## BEYOND SILOS – COOPERATION MATTERS

In renewal projects of existing lighting, as well as in maintenance and service operations, there are significant differences between cities, in terms of how the responsibilities for public lighting are organised. The organisation, in terms of ownership of the lighting, also differs. In some cities the lighting system is owned by the municipality, in others by the local energy company or similar.

Whether the municipality has a large or a smaller influence on the lighting system leads to important considerations for both the political level and for the urban and lighting planners to invest in a new or renovated lighting system.

Cooperation between departments or between lighting companies and municipalities improve the results of the new lighting. Even though it might be time-consuming, aiming for close cooperation has proven valuable. Both politicians and citizens express more satisfaction with the result. The more knowledge and complexity the task contains, the more important it is to cooperate.

Before changing the lighting in a neighbourhood, it is valuable to involve the citizens, both when it comes to changing the street lighting and organising more artistic or urban space projects. Methods vary due to different cultural and planning traditions. The citizens tend to show most

interest in areas close to their home or along their work-related commuting route. Since lighting is difficult to discuss, due to many technical terms and knowledge, the process can start by exploring different lighting solutions together and getting a common language to use in discussions via e.g. lighting workshops.

The field of citizen engagement is evolving, also when it comes to developing lighting projects. Both lighting designers and municipal planners are working on ways to improve the area. A wide range of tools can be used in such a process, for example different types of co-creation methods, workshops, focus groups, discussions with lighting ambassadors, a 'sandbox' with luminaries to choose from etc. In any case, it is essential to always go for case- and site-specific approaches.



Guerrilla lighting workshop in the Canute Garden

## CO-CREATING A LIVEABLE CITY

**WHAT:** In Hamburg lighting is managed by a city-owned lighting company. The local authorities (Bezirksämter) follow the main guidelines and requirements. In local projects, including lighting projects, a cooperation process is carried out on formal and informal levels. For Bezirksamt Altona liveability for all genders and diversity is a goal for city development. And lighting is an important tool to achieve liveable urban spaces.

**WHY:** The lighting company aims for road safety, cost efficiency and stability across the whole city and region when renewing and maintaining city lighting. In this perspective it is good to limit the numbers of different solutions and designs. Often the aim in city development and transformation is at more unique lighting solutions. The new solutions must be found in interaction between those aims.

**HOW:** To create liveable urban spaces, different projects are carried out. In cooperation with the citizens living in or using the areas in question, new ideas are generated. The role of lighting in the mind of the citizens are, in cooperation between the citizens, the local Bezirksamt and lighting designers, translated into new solutions.

**LEARN MORE:** [www.lucia-project.eu/wp-content/uploads/2021/07/LUCIA-lessons-learned-report\\_June-2021\\_co-creating-urban-lighting-solutions\\_web-version.pdf](http://www.lucia-project.eu/wp-content/uploads/2021/07/LUCIA-lessons-learned-report_June-2021_co-creating-urban-lighting-solutions_web-version.pdf)



LUCIA Light workshop in Hamburg

## CULTURE AND CONTEXT

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As a part of making the research for this booklet, several interviews were conducted with the LUCIA-project partners. The purpose of the interviews was to learn how the urban planner and lighting planner or manager cooperate when planning for lighting in their city. There are different sizes and positions of strength in the cities: from holiday-area Jurmala to capital Tallinn. In any case, the local culture and context set the frames on their individual work.

One of the main findings was that the city's cooperation with the energy company or the lighting management company is already in place. The cooperation is either on a formal level with coordination meetings and hearings or on an informal level where they consult each other on projects when they see a need.

All the project partners experience a good cooperation between colleagues in other departments or with other professions in same department when going from ideas to implementation. They point this out as a strength, but also as a barrier when it comes to implementation.

Not all cities wrote down the procedure for cooperation. They have tacit knowledge on how to proceed. But the cooperation in early phases is not always enough to avoid misunderstandings or obstacles in the implementation phase.

It is a common recommendation that some level of formal guidelines on the cooperation both in the early phase of strategy and planning and in the later phases of project design and implementation is preferable. It secures the holistic approach, helps the competence building, as well as being a good stepping-stone for new colleagues. But the informal cooperation should not be underestimated.

Another finding is that learning from each other through networks like LUCI ([www.luciassociation.org](http://www.luciassociation.org)) and projects like LUCIA ([www.lucia-project.eu](http://www.lucia-project.eu)) is a priority and considered valuable. The inspiration from abroad is adapted for local conditions. Taking part in seminars and events, urban planners and lighting planners and maybe even local politicians together, can add an extra value by getting the same input and evaluating together.

# GUIDELINES

Based on the themes addressed in the booklet the following guidelines sum up some of the elements in integrating intelligent lighting in urban planning

1. EARLY COOPERATION BETWEEN URBAN AND LIGHTING PLANNERS – FORMAL AS WELL AS INFORMAL – IS THE KEY TO THE BEST SOLUTION
2. ENSURE POLITICAL COMMITMENTS ON LONG TERM SUSTAINABLE AND CIRCULAR GOALS, PLANS, AND BUDGETS
3. USE THE PLANS – FOLLOW-UP ON IMPLEMENTATION OF THE PLANS
4. INTEGRATE LIGHTING IN ALL LEVELS OF PLANNING – FROM STRATEGY TO CONSTRUCTION TERMS
5. AVOID OPTIMISATION IN EACH INDIVIDUAL SECTOR – USE THE SECTORS TO STRENGTHEN EACH OTHER
6. CHOOSE THE RIGHT NETWORK AND MANAGEMENT SYSTEM – ADAPT TO LOCAL NEEDS
7. OWN, USE, AND HANDLE YOUR OWN LIGHTING AND SMART CITY DATA
8. LIGHTING IS FOR PEOPLE – LET SMART SYSTEMS SUPPORT THE LIFE IN THE CITY
9. CHOOSE THE RIGHT LIGHT FOR THE CONTEXT – EVERY LOCATION HAS ITS OWN CHARACTERISTICS
10. CHOOSE AN INTELLIGENT SYSTEM FOR THE WHOLE CITY, TO GAIN FULL ADVANTAGE OF DATA, OPERATION, AND MAINTENANCE IN THE SMART CITY
11. CULTURE AND CONTEXT MATTERS – EVERY PROCESS MUST FIT LOCAL NEEDS – BUT LEARN FROM AND INSPIRE EACH OTHER



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