N°9
Spring/Summer 2021

CITIES & LIGHTING

The LUCI network magazine

LUCI ASSOCIATION

FOCUS

Smart lighting initiatives across the world

Cities and industry on smart lighting opportunities and challenges

PERSPECTIVE

Life and light insights from Glasgow's City Urbanist

LUCI IN ACTION

Co-creating urban lighting in times of COVID-19

Smart Lighting: paving the way to a sustainable future

Editorial

Smart urban lighting continues to be a growing area of interest for the urban lighting community. As this has become such an important layer of our work on urban lighting, with great implications on our cities, we need to see what works and what does not work. In this ever-changing technological landscape, we are constantly thinking about the right strategies for our cities. This starts by asking the right questions, and having a better understanding of each technology, each solution and their implications in terms of societal and environmental impact, the added value for our citizens.

Unfortunately, due to the COVID-19 pandemic, we have not been able to experience other cities' projects directly or meet in person as often as we would like, but we have been able, within LUCI, to use digital connection capacities to stay connected and continue the spirit of exchange that is our network's backbone.

This new issue of Cities & Lighting continues this mission, the magazine brings directly into your hands additional insights on urban lighting projects worldwide, with a special *Focus* section that will enable us to see the big picture: how smart lighting can help our cities become even more sustainable. We are glad to share with you varied perspectives from leading smart city and smart lighting professionals. Also in this issue, among a myriad of highlighted projects, you will read about the impacts of the current context on urban lighting and what it entails for the future of our cities and our quality of life.

I hope you enjoy reading!

Meri LUMELA
President of LUCI
Chair of the City Board of Jyväskylä

Colophon

Cities & Lighting is published by:

LUCI Association
13 rue du Griffon,
69001 Lyon - France
T: 00 33 4 27 11 85 37
luci@luciassociation.org
www.luciassociation.org

Director of Publication:
Meri Lumela

Editor in Chief:
Mark Burton-Page

Deputy Editor:
Nikita Junagade

Advisory Board:
City of Budapest
City of Gothenburg
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City of Shanghai

Writers:
Noë Hautbois
Nikita Junagade
Marie Stotz

Graphic design:
Alain Benoit

Printing:
Imprimerie Brailly

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PERSPECTIVE

New lighting for Ódinstorg square

Reykjavík / Iceland

The Municipality of Reykjavík recently inaugurated a new look for the Ódinstorg square in the city centre. Formerly a parking lot, Ódinstorg, which connects a residential neighbourhood and a busy commercial area, is now a welcoming public space and living area.

This renewal was conducted within the framework of an urban design competition initiated by the City of Reykjavík. *"We wanted to transform the square into a versatile public space for locals. Creating a liveable space at night was very important as we have long periods of darkness being so far north,"* says Gunnar Hersveinn, Project Manager at the City of Reykjavík.

The square's lighting design, by Verkis, is based on a holistic vision for the area at night. The designers integrated lighting into the landscape design: area lighting is provided by discrete poles that blend with the other urban elements. The lighting installation also includes different lighting scenes depending on the seasons and times of the day. The objective is to create an inviting atmosphere even in challenging weather conditions.

"Reykjavík has gained a new gravity point that attracts, and cares for, both the needs of citizens and the many visitors of the city centre," says G. Hersveinn.

At a glance

- Commissioning authority: City of Reykjavík
- Lighting design: Verkis
- Urban design: Basalt Architects
- Completed in: October 2020

Five more bridges illuminated along the Thames River

London / UK

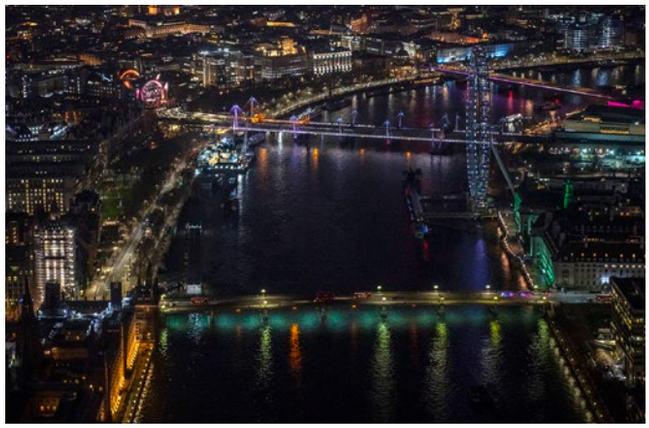
On 13 April 2021, the new lighting schemes for five bridges along the Thames were officially switched on. This initiative by the Illuminated River Foundation is part of a long-term art installation transforming the Thames at night with an orchestrated series of light works that span nine bridges in central London.

Blackfriars Road, Waterloo, Golden Jubilee, Westminster and Lambeth Bridges are the new additions to the Illuminated River project, after the inauguration of four bridges in Summer 2019. The project is now the longest public art commission in the world at 3.2 miles (5 km).

With a design team led by American light artist Leo Villareal and British architecture practice Lifschutz Davidson Sandilands, Illuminated River reframes the Thames at night. It has created a unified lighting concept to refocus attention on the Thames bridges, illuminating their separate identities while respecting the architecture and engineering of each structure.

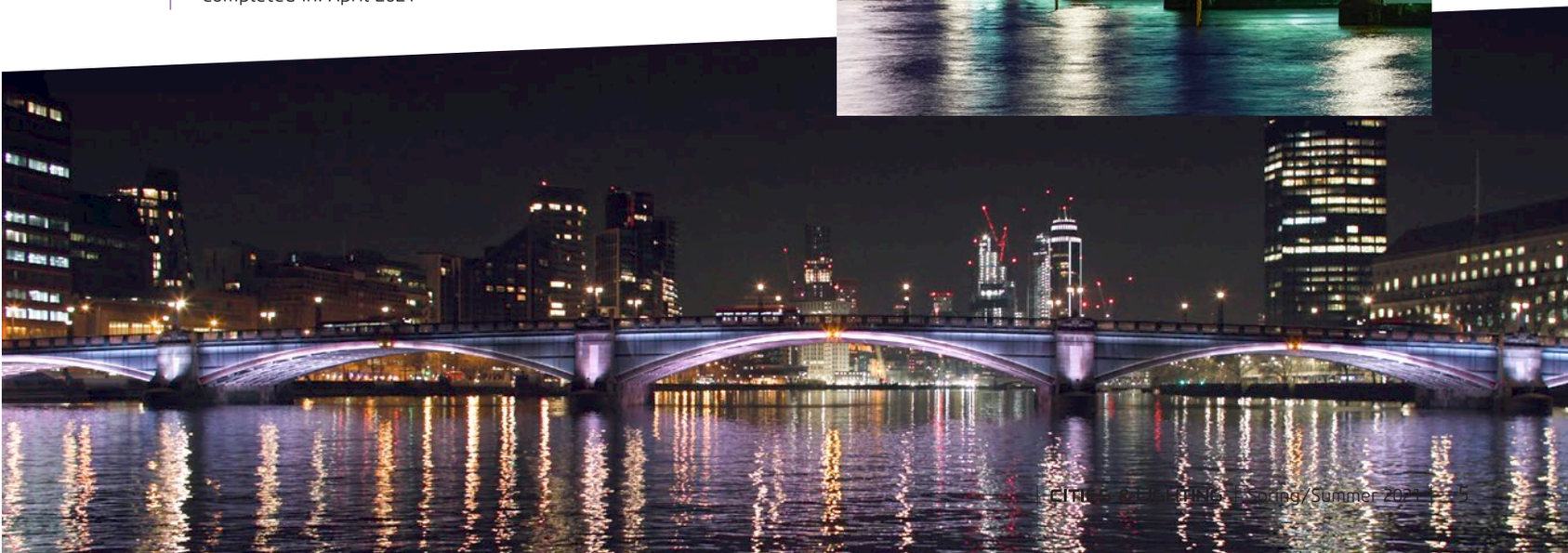
The project involved over 50 organisations on and around the river, and numerous entities from the private and non-profit sectors. Seven local authorities, including LUCI member City of London Corporation, have granted 30 planning permissions and 18 listed building consents – a record for a single lighting project.

It is estimated that 90 million people a year will see the nine-bridge artwork. The illuminations designed by Leo Villareal have a projected lifespan of ten years. The Foundation hopes that they will be ultimately adopted by the city and made permanent.



At a glance

- Commissioning authority: Illuminated River Foundation
- Lighting design: Leo Villareal Studio
- Completed in: April 2021



Cities of light in times of COVID-19

More than a year into the COVID-19 pandemic, cities continue to adjust to social distancing measures, as they prepare themselves for the post-pandemic future.

From Medellín to Seoul, to Rabat and Stavanger, municipalities across the globe in different phases of lockdown or re-opening, at different points in the pandemic waves, are collectively dealing with similar challenges.

The past year and the COVID-19 pandemic have clearly demonstrated the importance of urban parks and green areas, now essential spaces of recreation and social interaction. The desirability of illuminating green spaces at night has always been an ongoing discussion, but now, this new function of green spaces in cities means that lighting solutions that balance respect of nature with human needs will be all the more important in the years to come.

In many cities, the past year also enabled citizens to reappropriate public space in a new way: in some touristic cities, inhabitants "rediscovered" their own city without tourists; in other cities, less cars and more free time also meant that various social groups could use public spaces in a more "equal" manner. The surge in bicycle use means that many cities are now creating more bicycle lanes and dealing with the subsequent question of how to best adapt streetlighting, often designed principally for cars, to respond to such a situation.

Light has also been a beacon of hope in the past year. Cities across the world continue to communicate with light, illuminating major monuments or buildings (such as Seoul City Hall in the image below) to thank and honour health workers and others on the frontlines during the crisis; to commemorate lives lost to the disease; or to bring joy and lightness to otherwise dark times.

Artists rose to the occasion to find innovative ways to bring light art to the people: guerrilla-style light art projections were set up on building facades so that citizens could view some art from the safety of their windows and balconies. Indeed, the uncertainty regarding public cultural events, light festivals amongst them, continues today.

However, despite the everchanging situation, more and more cities are rising to the challenge, coming up with innovative ways to activate their public spaces, transform their cultural events, and continue supporting their citizens.

Rotterdam: on the road to all-LED streetlights in 2025

Rotterdam / The Netherlands

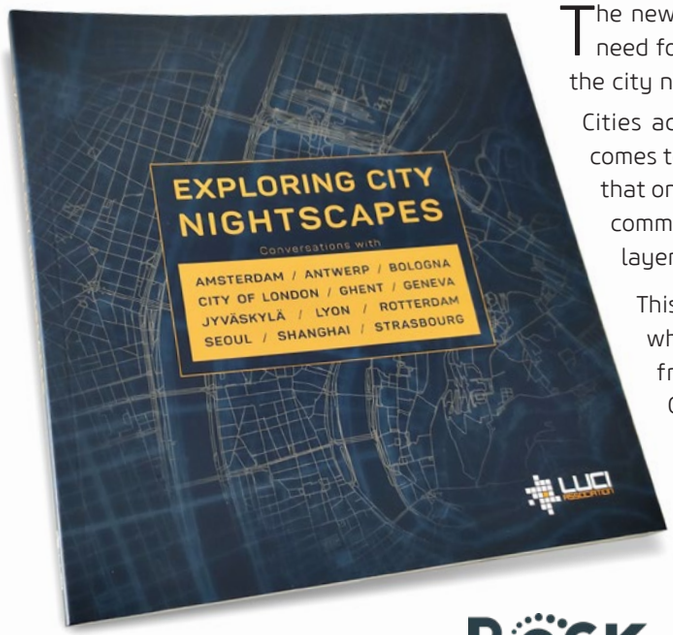
The City of Rotterdam has set itself an ambitious target: ensure that all of its 100 000 streetlights use LED technology by 2025.

While currently 15 % of the city's lighting system uses LED, the municipality aims to make that all-LED in the next four years.

This LED streetlight conversion is a key part of Rotterdam's energy transition programme: the city aims to be climate neutral by 2050. *"We have already extensively reduced our CO_2 emissions since all our public lighting is powered by green energy. But replacing all street lighting with LEDs will take us even further: it will reduce energy consumption by up to 30%,"* says Daisy van Eijck-Nilwik, Senior Advisor Public Space, City of Rotterdam.

To reach this target, the overall pace of LED installation in Rotterdam has considerably increased so that it now reaches 20% per year instead of the annual 4 %. *"We work neighbourhood by neighbourhood in a progressive manner. We have been installing an average of 400 luminaires per week,"* says D. van Eijck-Nilwik. The replacement work has continued over the past year despite COVID-19.

Creating a city nightscape: a collaborative process



The new LUCI publication *Exploring City Nightscapes* has highlighted the need for greater collaboration between the different actors that make up the city nightscape.

Cities across the world have varying ambitions and approaches when it comes to building their luminous landscapes. Despite this, most cities agree that one of the key requirements for governing the nightscape is increased communication with stakeholders, in order to better coordinate the many layers of light – private and public – that make up the nightscape.

This was one of the standout conclusions of *Exploring City Nightscapes,* which features conversations with urban lighting decision-makers from 12 cities: Amsterdam, Antwerp, Bologna, City of London, Ghent, Geneva, Jyväskylä, Lyon, Rotterdam, Seoul, Shanghai and Strasbourg. The book explores different approaches and common challenges linked to developing nightscapes.

The publication was produced by LUCI in collaboration with the City of Lyon with the support of the EU ROCK project.

ROCK

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730280.

The digital edition of the book is available for free download on the LUCI website: https://www.luciassociation.org/exploring-city-nightscapes/

New project about impacts of urban lighting on health

Launched in March 2021, the new research project ENLIGHTENme aims to collect evidence about the impact that outdoor and indoor lighting has on human health.

Funded through the European Union's Horizon 2020 Research and Innovation Programme, ENLIGHTENme, composed of an interdisciplinary consortium of 22 partners from ten countries, will receive €5 million over the next four years.

The project is coordinated by the University of Bologna in Italy. LUCI, one of the partners in this project, will be leading a working group of 15 international and diversified cities active on lighting issues related to health: the Health & Urban Lighting Advisory Board (HULAB).

Inappropriate and disruptive light exposure at night, or too little light exposure during the day, profoundly affects people's circadian rhythm, health and wellbeing. In particular, older adults over 65 years of age are prone to be impacted, with consequences for epigenetics and metabolism, predisposition to diseases including cancer, neurodegeneration, and psychiatric disease. Knowledge about the health effects and guidance for adequate urban lighting strategies have the potential to substantially counteract these developments.

Bringing together experts from different scientific fields and sectors such as urban development and health research, the ENLIGHTENme team aims to collect evidence about the impact of urban lighting on human health – especially in elderly people who are known to be particularly prone to suffer circadian misalignment.

Moreover, ENLIGHTENme sets out to develop and test innovative solutions and policies that will offset health inequalities in European cities. Partners will perform in-depth studies in three European cities – Amsterdam, Tartu and Bologna – to develop innovative, evidence-based policies to improve citizens' quality of life addressing indoor and outdoor lighting.

"Central to the success of ENLIGHTENme is a transdisciplinary approach, combining strong expertise from various fields and thematic areas: clinical and biomedical sciences, ethics and Responsible Research & Innovation (RRI), data accessibility and interoperability, as well as social sciences and economics. Together we will shed light on a multitude of relevant aspects and correlations such as mental health, lighting design, urban design and planning, wellbeing and quality of life, and technology development and application. The implementation of innovative lighting policies, whose cost-effectiveness and impact on health will be assessed by a population-based trial and qualitative fieldwork, will make it possible to evaluate the consequences of proposed solutions and decisions made in non-health sectors for public health and wellbeing," explains Prof. Simona Tondelli, Professor at the Department of Architecture at the Alma University of Bologna and coordinator of the ENLIGHTENme consortium.

Through an open, online "Urban Lighting and Health Atlas", ENLIGHTENme will collect and systematise existing data and good practices on urban lighting and will perform an accurate study on the correlations between health, wellbeing, lighting and socio-economic factors.

ENLIGHTENme, together with five other projects, is part of the EU's new "Urban Health" cluster.

ENLIGHTENme will host the international conference "Shaping light for health and wellbeing in cities" on 16-17 December 2021. The virtual event will bring together representatives from academia, industry and local administration from across Europe for two days of exciting talks and discussions around latest findings on urban lighting in relation to citizen's health and wellbeing. Researchers are invited to participate in the open calls to submit extended abstracts until 4 October 2021!

More information:
https://www.enlightenme-project-conference.com/

The ENLIGHTENme project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 945238.

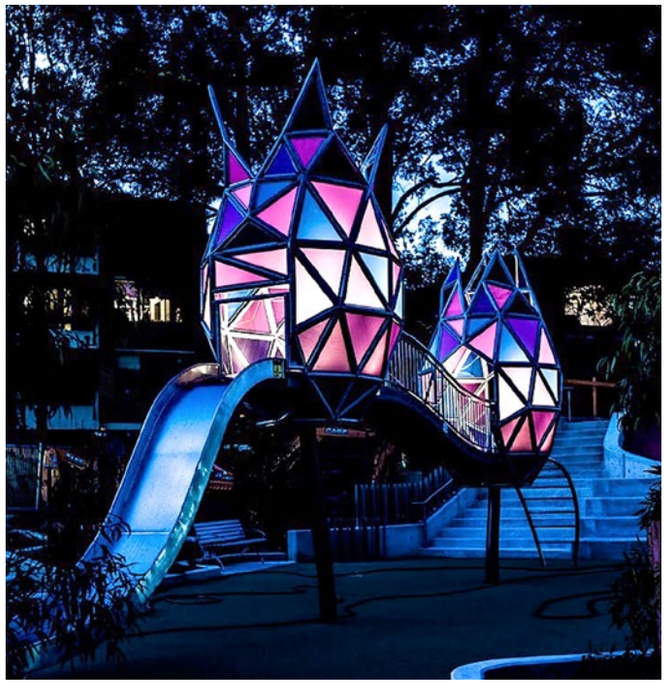
Playing with light art

Ryde / Australia

Flora Kingdom, a unique play-equipment light art piece is the new focal point of the children's play area in Elouera Reserve, a recreational green space surrounded by high-density apartment housing in Ryde, a suburb of Sydney.

The artwork, comprising of two colourful floral buds with timber deck, slide and ladder, is a combination of play equipment and landscape feature. During the day it invites children to play amongst the coloured UV resistant, shatterproof plexiglass flower panels. At night, through integrated lighting, the buds emit a localised glow and transform into floating jewels.

Light art has made this children's zone a unique feature of the park, creating a focus and sense of place as well as a play opportunity.



At a glance

- Commissioning authority: City of Ryde
- Lighting design: Steensen Varming
- Completed in: 2020

Creative Europe co-funds project on light & art

Kicked-off in February 2021, Light & Art in Public Spaces (LAiPS) is a new EU project that aims to build municipal knowledge in the field of permanent light art. Led by LUCI, this three-year project co-funded by the Creative Europe programme, includes the cities of Lyon, Oulu and Turin.

Light & Art in Public Spaces aims to strengthen city capacities on permanent light art installations in public spaces by fostering international cooperation among cities, exchanging best practices and making use of innovative digital tools.

The project will develop a Light & Art Lab – a platform combining site visits and good practice exchanges – in order to strengthen the operational capacities of local creative operators, including city officials, technical staff and artist. LAiPS will also create a digital tool to promote knowledge and exchange on light art in the urban space.

Light & Art in Public Spaces

Co-funded by the Creative Europe Programme of the European Union

Pop-up lighting boosts community spirit in Glasgow

Glasgow / UK

A participatory lighting event aiming to bring people together and create community spirit enlivened the city centre of Glasgow on 12 - 20 December 2020.

The event, entitled 2020 Visions, asked what the future holds for the city centre community during the COVID-19 pandemic when high streets are changing, office blocks are emptying, and shops may be closing.

Led by Nich Smith Lighting Design, street level windows were taken over with installations inspired by the stories of local people who contributed to the project online by sharing their hopes and dreams for the future.

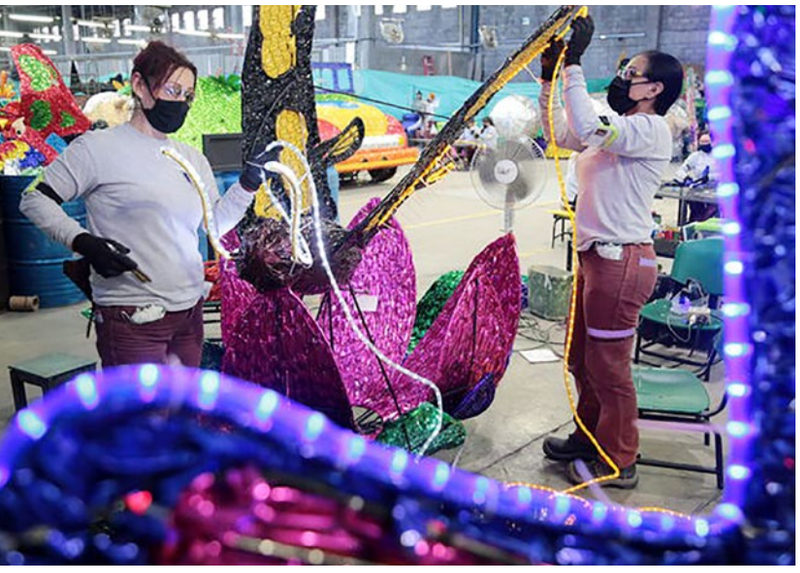
It encouraged inhabitants to get out of their homes to explore this pop-up art initiative and have fun during difficult times. *"2020 Visions was inherently COVID-19 proof in its design and delivery. As a free, outdoor and self-guided event it afforded a safe environment for people to enjoy themselves in a socially distanced way during lockdown,"* says Kevin McCormack, Group Manager City Development Plan at Glasgow City Council.

Christmas Lights with a social conscience

Medellín / Colombia

Medellín, the second-largest city in Colombia, held its famous annual Christmas Lights display in December 2020. The event has been organised by the local utility company, Empresas Públicas de Medellín (EPM), for 53 years.

In 2020, the light displays featured 28 million LED lights, and more than 30 000 hand-woven figures. Medellín Christmas Lights involves more than 150 employees each year. EPM puts a strong emphasis on socially conscious hiring, focusing on people who have difficulties accessing the labour market, such as single mothers.



María Isabel Zuluaga Gomez, an architect and lighting designer at EPM, explains: *"The festival is usually held from 30 November to 31 January. Every year, we choose the theme based on a survey with inhabitants. This year, however, because of the pandemic, we chose a special theme: 'This Christmas, stay in Colombia, your home'."*

With this play on the "stay-at-home" orders issued in many cities across the world in 2020, the organisers invited Colombians to eschew holidays abroad, and become tourists in their own country. They tapped into the rich history, traditions, fauna, and flora of Colombia to create the illuminations of this year's festival. The main route of the festival was built around the country's five natural regions: the Caribbean Sea, the Pacific Ocean, the Andes, the Orinoquía (Eastern Plains) and the Amazonian jungle. Along the river of the Parques del Rio, in the heart of Medellín, festivalgoers could admire representations of animals and symbols of each region.

In other parts of the city, the Christmas Lights also represented the historical and social aspects of Colombia. Immersive light art reminded the audience of the diversity of the country, with tributes to its indigenous and afro-descendant communities. Due to the COVID-19 pandemic, special rules were implemented with regulated access. The event remained a success, especially with families and selfie amateurs!

Introducing Meri Lumela, the new LUCI President

On 9 November 2020, LUCI members elected a new Executive Committee. The City of Jyväskylä (Finland), represented by Meri Lumela, Chair of the City Board, will be President of LUCI for the next two years.

Can you tell us more about yourself, and why you wanted your city to be President of LUCI?

I am the Chair of the City Board of Jyväskylä, and I have also been working as a teacher and school principal for many years now.

Jyväskylä is the largest city in Central Finland, and light is an integral part of its identity. We have been a member city of the LUCI network since 2006 and, as such, we are very familiar with the network and its ongoing activities.

I feel that our active participation [the city of Jyväskylä has previously been Treasurer and Vice-President] has naturally led us to this point. We are ready to bring something new to the table, and see the network grow in these next two years!

What are your main priorities and ideas for the next two years?

Our priority is to work on the issues of environment, climate, and biodiversity. For example, we want to see how new technologies can help us control light pollution. The City of Jyväskylä also holds an annual light festival [Valon Kaupunki, translated as "City of Light"], and so we want to foster cultural exchanges around this topic, and create opportunities to learn from other festival organisers.

In general, we want to create spaces to share, participate and learn equally and safely from anywhere. In that regard, this particular year has shown us the importance of digital tools. We also strongly believe in the importance of research and science, and how they can be applied to improve our everyday work.

Finally, we want to build upon the existing internal organisation of the network. We want to develop the five LUCI Pillars – Art & Culture, Governance, Health & Wellbeing, Public Spaces, Social Cohesion – as working groups, to allow members to work together on all the important issues covered within LUCI. Excellent work has been done so far!

We want LUCI to strengthen its position on the global stage, thanks to the expertise of its members. And for that, we will need to develop new projects, and improve the way we share and learn from each other. LUCI can be an important driver for better lighting all around the world!

You mentioned how 2020 was a particular year. How can lighting help cities in these changing times?

Light affects our daily lives. We all know how the quality of a lighting design can make a difference for our quality of life. The impact of technology on our wellbeing and on human behaviour will be a big issue in the coming years.

One thing is clear: in the future, cities will need to favour the quality of their lighting, as opposed to the quantity.

The question for LUCI is: as a global network, how do we make a difference? We need to show how better lighting positively impacts safety and social cohesion, or how it can improve the appeal of our cities' public spaces.

These are, definitely, exceptional times! A lot can be done through online interaction, but we do hope to see each other in person very soon!

Smart Lighting: paving the way to a sustainable future

Light in the smart city

Building a smart city is as popular as ever worldwide, but what does smart really mean and what is the role of urban lighting in this journey towards smartness and sustainability?

The smart city sector has greatly progressed since Cities & Lighting last addressed the topic of smart lighting six years ago. Indeed in recent years, cities around the world have multiplied “smart” initiatives.

As we see in numerous discussions within LUCI and beyond, “smartness” points more towards a way of thinking – a process that is different for every city – rather than an end in itself. This process is designed to drive cities to seek increased sustainability for their services, their infrastructure, their social fabric or their economy.

For some cities, smartness is linked to greater reactivity or interactivity – setting up city infrastructure that adapts and responds in real-time to users’ or municipal needs, be it in terms of mobility, parking, waste-management or streetlighting. For other cities, smartness is more related to setting up and managing systems of infrastructure that are optimised across all levels: energy-efficiency, procurement, costs, staff

resources etc. to result in the configuration that is the most sustainable possible. In short, it is about harnessing technology, digitalisation and data to create a citizen-driven and open-innovation ecosystem.*

That being said, the boundaries of what defines the "smart city" continue to shift with the passage of time, development of technologies and the evolution of the vision on the future of cities. And within this frame, urban lighting's role has also been shifting.

The street lighting pole, an asset of municipal infrastructure ubiquitous throughout the urban space – with its capacity to host a variety of sensors and connect to multiple networks – is today generally recognised as one of the vectors to building smart cities.

Can a city be smart without a lighting strategy?

Despite that, many "comprehensive" smart city projects tend to minimise or even overlook the role of a distinct urban lighting strategy. Numerous "smart cities", in fact, do not specifically mention a lighting strategy, or instead merge it with an overall energy reduction strategy which tends to limit the diverse beneficial outcomes of smart lighting installations.

Some of the largest smart city projects in the world (Masdar City in the United Arab Emirates, the Songdo district in South Korea) do not mention urban lighting in their official communication. On the other hand, cities such as Finnish capital Helsinki and Dutch city Eindhoven, have long ago integrated their lighting strategy as a key aspect of their smart city programmes. Considering such varying contexts, many questions arise: What are the manifestations of smartness? Can a city be smart without a lighting strategy? What are the different levels of smartness?

Facing rapid and complex transformations dominated by climate change and now the COVID-19 pandemic, urban governance is put to the test on a daily basis, and all cities worldwide are in the pursuit of sustainable solutions: these include making cities adaptable to the future and everything it entails, reflecting on the scale(s) of such smart strategies, and fostering interoperability for greater efficiency and coherence.

The integration of urban lighting as a key element on any path to a smarter city is essential: urban lighting is more than the physical infrastructure of a network of lampposts, and more than numbers reducing carbon emissions. High quality urban lighting is also an indicator, a catalyst, and a manifestation of the priority given to an elevated quality of life in the city, something that all smart cities aspire to.

*For further reading: "JOIN, BOOST, SUSTAIN", the European Declaration to join forces to boost sustainable digital transformation in cities and communities.

Smart lighting initiatives around the world

To what extent have cities implemented smart lighting in their urban spaces? Cities & Lighting takes a look at some initiatives – from pilot projects to city-wide deployments – across the globe.

Over the past few years, cities around the world have initiated smart lighting projects of varying scales and ambitions. Indeed, there are different ways lighting can be smart, connected, or intelligent; and there are different levels of what is called "smart lighting". Experts have dedicated much time and effort to navigating the different facets of smart lighting in a city*. From the perspective of cities, however, smart lighting, in its essence, provides the opportunity to adapt public lighting to the needs and moods of citizens, where and when required.

Smartness applied to urban lighting has brought about pilot projects linked to light dimming, remote monitoring, wellbeing through lighting, and more, through technical tools such as multi-purpose smart poles (accumulating several functions combining street lighting and EV charging, weather detection...), or the use of sensors and colour filters, etc.

However, while smart lighting pilot projects are increasingly common, large-scale deployments of smart lighting to its full potential (adapting to real-time conditions) are still rare.

This is understandable, as pilots are the essential first steps in a process: they are the only way that cities can explore, understand and make decisions based on their real needs (as well as those of their citizens) and obtain a real understanding of the practical implications of the use of smart technology before they decide to scale up.

Pilots are essential first steps

A look at some of the many smart lighting projects in the world today highlights the variety in scales, motivations and priorities of each city, based on their own unique contexts.

They also raise some of the questions that often hamper cities from evolving from pilots to large scale roll-outs. These include uncertainties linked to data ownership and privacy, to interoperability of platforms and systems, to financing and total cost of ownership, just to name a few. It is only by exchanging practices and learning from each other that cities will find answers to these questions and fully harness the potential of smart lighting technologies.

*See box page 24 for reference documents.

PILOT / 2019

City of Geneva tests smart public lighting with university

In 2019, the City of Geneva (Switzerland) initiated a series of pilots combined with a university research study to better understand the implications of smart lighting and the different nocturnal ambiances it enables in the city.

Two test sites with different contexts and uses – an alley in a neighbourhood park, Franchises Park, and part of Voltaire street, a busy shopping and residential zone – were fitted with intelligent LED lights featuring various scenarios of fixed and dynamic lighting.

The equipment, provided and installed by Geneva-based company Infomir, consisted of 20 test lights on the two sites. Each luminaire could be controlled individually or in groups, with a different brightness level, through control programmes. They could function in two different modes: either in "dynamic mode" based on movement detection, or in "fixed mode" with light intensities defined according to certain times as specified in the control program.

This pilot initiative was accompanied by research conducted with the University of Geneva by Chantal Vetter within the framework of a Masters degree in Territorial Development, aiming to study the social and sensitive dimensions of this type of lighting.

"It was important for us to go beyond technical testing of smart lighting on-site in Geneva. We wanted to go beyond questions of energy and economy to have a deeper understanding of the real perspectives and feelings of people in relation to the different lighting ambiences made possible by smart technology," says Florence Colace, Lighting Designer at the City of Geneva.

The study incorporated night walks with around 30 inhabitants from all backgrounds, to better understand their perspectives on the distinct nocturnal ambiences made possible by the smart lighting scenarios, as well as the multisensory experiences related to them. In addition to exploring the perception of users, the research also aimed to explore a variety of questions such as how to ensure the comfort of users through this technology, how to guarantee public lighting quality, and how to integrate the human scale into such projects.

The study findings confirmed that smart lighting technologies can be a valuable tool for cities, enabling them to adapt public lighting to the needs and uses of citizens, while at the same time meeting the main imperatives and challenges of public lighting management.

"This type of research is very important for the City of Geneva, particularly in the ever-changing domain of smart lighting, as it helps us to better orient our steps forward in the future." says F. Colace.

In the coming years, the City of Geneva, as part of the review of its lighting plan (published in May 2021) plans to use the technological possibilities of presence detection and remote management wisely.*"Since all these technologies themselves generate grey energy, they will be used only where their use is relevant and where they bring real added value,"* says F. Colace.

LUCI members can download the full research study on the LUCI Hub!

TECHNICAL DETAILS

Location: Franchises Park and Voltaire street

Project implementation: 2019

STAKEHOLDERS

- Contracting authority: City of Geneva
- Installation: Infomir
- Maintenance: City of Geneva

EQUIPMENT

- Lamps: Infomir JOOBY ™ Avenue, LED 3000K 60W and 80W
- No. of lighting points: 20 (10 + 10)
- Network: LoRaWan

PILOT / 2019

Sint Niklaas – a small city with big smart lighting ambitions

As a partner of SMART-SPACE, a European project funded by Interreg North West Europe, the City of Sint Niklaas (Belgium) is implementing a smart lighting pilot using an interoperable and adaptable smart lighting sensor platform developed for the project.

Light points in 14 streets and squares of the city are being replaced by remotely controllable LEDs with sensors. Different adaptive lighting scenarios have been identified for different areas, based on their uses and needs. In the main city squares, Sint-Nicolaasplein and Houtbriel, the lighting atmosphere will vary according to the type of activity taking place.

In Stationsstraat, Sint Niklaas' main shopping street, the new lighting will be coordinated with the shop window lighting: a sensor will ensure that the public lighting is dimmed when the shop windows are fully illuminated, and vice versa.

SMART-SPACE is a three-year project bringing together cities and innovation stakeholders (research institutes, SMEs, LUCI, enterprises) to facilitate the uptake of smart lighting in small and mid-size municipalities.

Interreg North-West Europe SMART-SPACE

PILOT / 2020

Osaka - smart lighting demonstrator project

Osaka in Japan has recently launched a smart city lighting solution demonstrator project within the framework of the "People's Living Lab".

The test project, backed by the Osaka City Government, the Osaka Prefectural Government, and the Osaka Chamber of Commerce and Industry, has installed the pilot streetlights on six roads in the city.

The levels of illuminance of the LED streetlights are centrally controlled. The streetlights are equipped with sensors that can monitor surrounding environmental conditions including wind speed/direction, temperature/humidity, atmospheric pressure, rainfall, illumination, UV and vehicle acceleration. A specific goal is to ascertain whether it is possible to monitor the weather conditions that can be used to inform road management operations in summer and winter season.

In addition to environmental sensors mounted on the streetlights, it is also planned to incorporate a camera for measuring traffic volume, a water level sensor for detecting flood water and a snow depth gauge for measuring precipitation.

PILOT / 2021

Seoul tests smart poles

Several cities across the world have launched pilot projects testing smart poles – lighting poles equipped with a variety of non-lighting related functionalities. The City of Seoul is one of the latest to do so: 26 smart poles ("S-Poles") have been installed in six areas of the city. In addition to acting as streetlights, the poles also function as traffic lights, environmental sensors, footfall counters, CCTV posts, smartphone chargers, and Wi-Fi access points, among others.

Each pole will feature area-specific technology in addition to its basic functions. S-Poles at Seoul Plaza, the square in front of Seoul City Hall, feature the city's public WiFi access points. Those near Sungnyemun Gate, a major tourist site, carry QR codes through which users can access information on cultural assets.

In addition, the Seoul Metropolitan Government (SMG) plans to further enhance the service by the end of this year incorporating advanced smart city services for citizens, such as chargers for electric vehicles, and parking violation detectors. The City also plans to set up drone stations on the upper part of the poles as it aims to use drones for potential emergency rescue efforts.

This is only one of the latest new functionalities integrated into smart poles. Several other options are possible, as demonstrated by the many other smart pole pilots underway in cities such as Budapest (Hungary), Rotterdam (The Netherlands) and Stavanger (Norway).

ZONE 3 (5m~)

- Streetlight
- CCTV
- Public WiFi
- Autonomous vehicle control
- S-DoT
- Drone
- Future technology

ZONE 2 (2~5m)

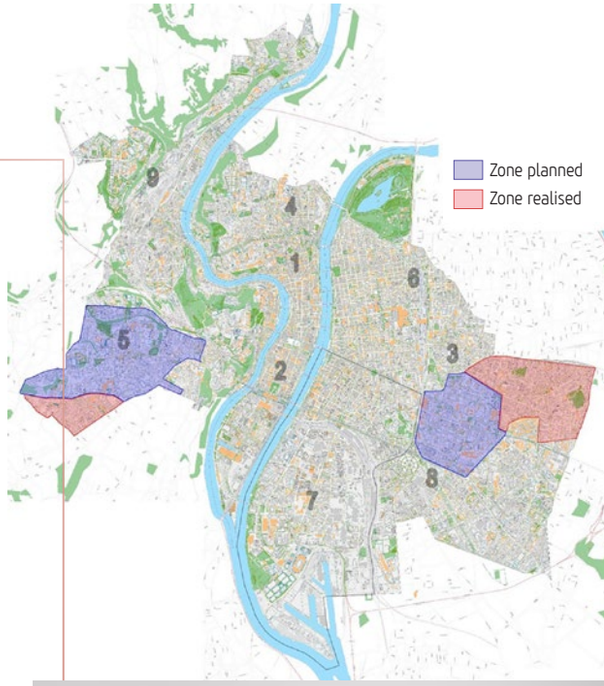
- System cabinet
- IoT
- Footfall counter
- Streetlight
- Street name
- Future technology

ZONE 1 (0~2m)

- Panel board
- Electrical charger
- City guide
- Emergency bell
- Handhole
- System cabinet
- Future technology
- Parking detect

DISTRICT-SCALE PILOT / 2014 -2021

Lyon extends presence-detection pilot



The City of Lyon will be extending a streetlighting pilot on presence detection of vehicles via radio frequency to three more residential districts of the city.

Lyon has been working with adaptive lighting based on presence detection for over 15 years. It first began in small enclosed public spaces or walkways and pedestrian bridges. These initiatives enabled the city to test such technologies and their acceptance by citizens and led to the city launching a pilot on a larger scale of an entire neighbourhood.

In 2014, Lyon launched a neighbourhood-wide pilot project to test street lighting based on presence-detection of vehicles. Over 200 lighting points in Lyon's 5th district, were connected to a centralised control capable of detecting when vehicles passed on the road using magnetometers and high frequency radars, and adjust lighting levels accordingly. This was the first time that such a device was tested on such large scale. The success of this initiative has now led the city to extend this installation to three more residential districts of the city.

"The initial pilot in 2014 aimed to test the technology, its social acceptability and the various parameters that could be applied (lighting levels, thresholds, ramps, delays, etc.) as well as the resulting energy-savings," says Frédéric Durand, Project Manager at the Urban Lighting Department in Lyon. *"The pilot did not work perfectly at first, we had to improve it technically and adjust the settings, but the energy-savings were there: we saved 70% in energy,"* he adds.

The city continued improving the device and had already extended its use to a second area, the Montchat district. *"We continued with our objective of adaptive lighting as required, as this enables us to save energy without deteriorating the lighting service we provide to the public."* says F. Durand.

The pilots have provided important lessons that the city has used to improve subsequent initiatives. For example, the municipality now only launches the presence detection between 22:00 and 6:00 in the morning, since during the other busier hours, heavy traffic led to the installation flashing constantly. *"We also had to make several technical adjustments between the detectors and the communication protocol and had to take the decision to limit this communication to avoid saturation,"* says F. Durand. It was also important to have remote management deployed in the test zone, in order to facilitate maintenance of such a system, since visual human verification is no longer possible in such a complex setting.

This year, this system will be extended to new residential neighbourhoods in the 3rd, 5th and 8th districts of Lyon with over 1650 lighting points involved. In these areas, the streetlights will go into "pedestrian" mode, with reduced brightness, sufficient for passers-by. Sensors at each end of the street detect the arrival of a vehicle and relaunch the maximum intensity of light as the vehicle passes. As a result, the streetlights are in reduced operation for 90% of the time, leading to 70% energy-savings for the city.

TECHNICAL DETAILS

Location: 3rd, 5th and 8th districts of Lyon

Project implementation: April 2021

STAKEHOLDERS

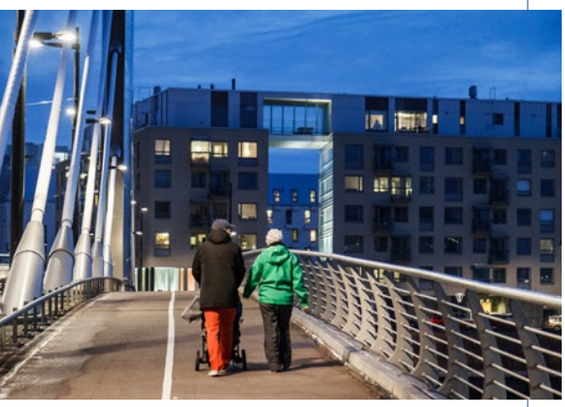
- Contracting authority: City of Lyon
- Installation: Eiffage Energie, Serpollet
- Maintenance: City of Lyon

EQUIPMENT

- No. of lighting points: 1500
- Lamps: 1650
- Manufacturers: Signify, Eclatec, Comatelec
- Detecters: Capsys (high frequency radars)
- Control solution: Echelon
- Network: Citylone
- Protocol: lanworks
- Energy savings: 600000 kWh

LARGE-SCALE DEPLOYMENT / 2019

Helsinki – streetlighting adapting to traffic in real-time



The City of Helsinki, which has been working with its city-wide smart control system since 2013, is now developing a dynamic lighting solution where lighting levels can be adjusted according to traffic intensity.

Helsinki currently has a control system that enables the programming of dimming profiles for its streetlights. The City aims to stop using dimming profiles programmed in advance, and switch to dynamically adjustable dimming profiles. This will be done using real-time information on traffic volumes, which besides controlling traffic lights, will also be used to control street lighting: the intensity of the lighting is automatically adjusted according to the amount of traffic. *"In addition to saving energy, this creates more adapted lighting for citizens, automatically adjusting the brightness of streetlighting when there is a lot of activity in the mornings and evenings,"* says Olli Markkanen, Head of Unit, Municipal Engineering, City of Helsinki.

The city's control solution enables this to be easily automated either for the entire street lighting group, or for a single luminaire. The solution includes programmable smart nodes that can control individual luminaires and monitor the condition of both lamps and poles. The nodes recognise if a pole is slanted or if it has been hit by a snowplow or a vehicle in a traffic accident. *"For the City of Helsinki, it is not only important to get information about failures of luminaires, but also to predict faults. Programmable smart nodes enable us to monitor our maintenance needs, allowing the city to reduce maintenance visits on the field and the costs of maintenance,"* says O. Markkanen. The City has started to add smart nodes onto every luminaire this year.

O. Markkanen also brings up another key point: *"It is important to note that the city is changing all the time and the life cycle of street lighting is long. What is working for lighting now, may not in five years' time."* That is why the City of Helsinki's Smart City unit has decided on automating street lighting and purchasing programmable smart nodes for all streetlights. *"Sensors are the eyes and ears of a modern city. They help us better adapt our services. Helsinki is already using its outdoor lighting control solution as a part of the urban environment sensing solution,"* he adds.

The City of Helsinki also sees sensors and smart lighting controls as a means to help it achieve its goals of becoming a carbon-neutral city in 2035.

TECHNICAL DETAILS

Location Helsinki (Finland)

STAKEHOLDERS

- Contracting authority: City of Helsinki
- Installation by: ISS
- Maintenance: City of Helsinki

EQUIPMENT

- No. of lighting points: 92000
- Lamp manufacturers: Greenled, Signify, Schréder, AEC, Siteco
- Streetlight control solution: C2 SmartLight Oy (C2 SmartLumo smart nodes)
- Network: GSM, RF
- Protocol: ZigBee
- Total cost: € 22000000

LARGE-SCALE DEPLOYMENT / 2019

San Diego – using its streetlights to build a city sensor platform

As is the case in many cities in the past decade, San Diego in California initiated its smart lighting project as a cost-saving effort replacing old sodium vapour streetlights with more efficient LEDs.

In 2019, San Diego installed over 3000 smart "CityIQ" streetlights across the city. Each CityIQ streetlight had two 1080p video cameras, two acoustical sensors, as well as environmental sensors that monitor temperature, pressure, humidity, vibration, and magnetic fields. The sensors can connect city officials and citizens to near real-time data of vehicle, pedestrian, and bicycle traffic across San Diego.

This data, being openly accessible, allows for endless applications. Some of the applications include new services like assisting drivers to find vacant parking spots. Traffic management at junctions can be improved and police officers can be alerted of traffic offences. The city also aims to use bicycle data to help planners ensure they are building bike lanes where needed to enhance mobility throughout the city.

One of the particularly innovative solutions adopted by the city was to use the smart streetlight sensors for improved public safety. The application ShotSpotter uses the sensors' sound and light detection capabilities to help law enforcement react to gunshots in the city. First responders can triangulate where the shooter is, how many shooters there are, and which direction they are shooting in. Smart sensor data has also provided additional clues to help law enforcement correctly identify criminals.

However, the use of videos from the streetlights by the city police department has led to major concerns over privacy and individual rights. The use is currently in review, highlighting the importance of data-use and privacy policies to govern such smart lighting initiatives.

Another issue that San Diego has faced is related to the ownership of the sensor platform. The city originally contracted with a company to run the cloud-based analytics of sensor data on its CityIQ platform. As part of that contract, the cloud operator, rather than the city, owns any algorithms derived from the data. However, in 2020 this company was acquired and dismantled by a private equity firm, leaving the city to now renegotiate its contract.

LARGE-SCALE DEPLOYMENT / 2020

Syracuse – one of America's "Eight Smart Cities to Watch"

The City of Syracuse in New York State has installed citywide streetlights with smart technologies to improve WiFi connectivity, environmental monitoring and combat climate change. More than 100 000 LED streetlights were installed in November 2020.

This initiative in partnership with the New York Power Authority (NYPA), saves the city $3.3 million annually and will reduce greenhouse gas emissions by nearly 8 500 tons a year.

Implemented by NYPA, the initiative includes the replacement of approximately 17 500 streetlights throughout the city with smart LED streetlights. They are equipped with smart controls that provide programmed dimming ability, energy metering, fault monitoring, and additional tools for emergency services through on-demand lighting levels.

The city has utilised additional funding to support special features on the streetlights focused on digital connectivity, environmental monitoring and public safety, expected to be fully implemented in 2021:

- The city is planning to deploy exterior Wi-Fi at community centres and public spaces.
- The implementation of ice and snow detection systems that can assist city officials in pinpointing streets covered in ice or snow and requiring attention to prevent accidents and improve safety. Flood reporting and monitoring systems will also be installed.
- Illegal dumping and vandalism detection sensors will be installed at strategic locations to help mitigate these disturbances. Vacant house monitoring will also be deployed by the city. The system can monitor for potential fires, detect motion and provide temperature and humidity readings of vacant homes. Trash bin sensors will be installed at various locations throughout the city that will detect when a trash bin is full and alert local officials for pick-up.

The City of Syracuse has been named one of America's "Eight Smart Cities to Watch" by the StateTech Magazine which covers information technology for state and local governments in the USA.

LARGE-SCALE DEPLOYMENT / 2021

Brussels – a step-by-step strategy for a future-proof system

The Belgian capital and its public lighting operator, Sibelga, have just launched an ambitious project deploying intelligent streetlights across the city.

The main objective of this initiative is to improve the lighting service for the population. *"Currently over 50% of streetlight failures are identified by the citizens,"* says Bénédicte Collard, Streetlighting Manager at Sibelga. *"We wanted first and foremost to better manage our system and ensure lighting quality."*

Step-by-step approach

Sibelga has taken a step-by-step approach for the deployment of this new smart system. In recent years, since 2017, it had installed control-ready streetlights. Deployment of the smart system therefore first begun on these existing streetlights: as of April 2021, 3000 streetlights were connected, with a target of 9000 to be connected by the end of 2021.

These streetlights are equipped with a luminaire controller (see image to the right), a small device about 8 cm in diameter, that sends and receives information via existing GSM networks (4G) or a radio frequency network. In most cases, this luminaire controller is placed directly above the streetlight and is therefore practically invisible from the ground.

The new-generation luminaires are remotely controllable, enabling more efficient management of public lighting: information about the status of each lighting point at any time is available, making it possible to identify broken luminaires and failures. Precise operating or dimming times can also be assigned to each lighting point. Dynamic lighting will soon be possible, with lighting levels adjusted based on traffic and weather conditions.

Open, interoperable solution

Sibelga has opted for an open connected lighting solution, which guarantees a high degree of independence in terms of equipment suppliers. *"We absolutely wanted to avoid being trapped by a particular solution or supplier, which would have been detrimental to us in the event of a major price increase, for example,"* explains B. Collard.

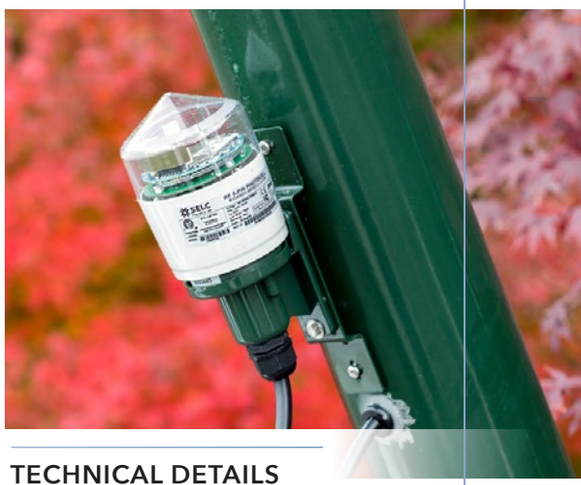
Sibelga thus required a high degree of interoperability, of both hardware and software, between different suppliers and with its own IT systems. Its tender called for standardised sockets, universal protocols and product interchangeability. The CMS had to be able to support several light point controllers and be replaceable if required. To ensure vendor flexibility and smooth connectivity, all smart street lighting solutions that participated in the tender had to be TALQ2 certified.

"We wanted all luminaire controllers to communicate on a standardised non-proprietary wireless long-range network with a unified data model," says B. Collard. *"But this was not so easy to find."*

Over 23 major smart street lighting providers participated in the tender. After thorough testing procedures, Sibelga selected ENGIE Fabricom as the overall service provider, combined with nodes and other hardware solutions from a mix of manufacturers, including Schréder.

Starting this year, Sibelga will systematically deploy the solution when replacing or installing new streetlights. As a result, the region will have around 20000 streetlights (which is roughly 25% of the public lighting) connected by the end of 2023.

This smart lighting rollout will make it possible to cut electricity consumption in the region by 20% by 2035 (i.e. 1.5 % per annum), and result in a 4000-tonne reduction in CO_2 emissions each year.



TECHNICAL DETAILS

Location: all around Brussels

STAKEHOLDERS

- Contracting authority: Sibelga
- Installation: Sibelga
- Maintenance: Sibelga

EQUIPMENT

- No. of lighting points targeted: 9000 in 2021; 20000 by end 2023
- Manufacturers: Schréder, SELC, Flashnet
- Control solution: Citylinx + SmartInfra
- Network: 4G + Zigbee, WISUN, NB.IoT
- Protocol: TALQv2
- Energy savings: 20% by 2035

LUCI members can access tender documents or re-watch the LUCI Coffee Bre@k webinar & Q/A session on the project in the LUCI Hub.

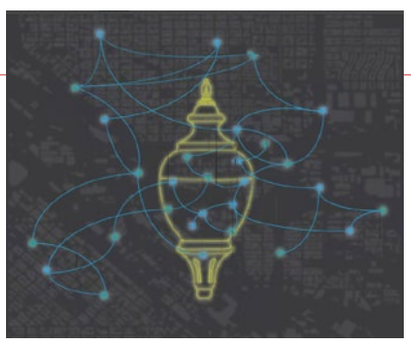
RESOURCES ON SMART LIGHTING

Want to go into the details of smart lighting and how you can implement it in your city?

Go through some of these documents:

- ***The Value of Smart Urban Lighting*** by Eindhoven University of Technology (TUe) within the framework of the Interreg North-West Europe project SMART-SPACE.
- ***Municipal Smart City Street Light Conversion & Evolving Technology Guidebook,*** an American report developed by Planning4Places with the International Nighttime Design Initiative.
- ***Lucia Compendium Vol I*** – a report on sustainable and smart urban lighting by "Lucia – Lighting the Baltic Sea Region" project.
- ***Cities & Lighting magazine n°1*** on Smart Lighting for Smart Cities.

LUCI members can find all of these documents, detailed case studies and more on the LUCI Hub!



Smart lighting: **opportunities and challenges**

Leading city representatives and industry partners share their views on opportunities and challenges regarding the next steps for smart lighting.

VIEWS FROM CITIES

Helene QVIST | SMART CITY CONSULTANT, CITY OF ALBERTSLUND

"We need to ask the right questions and keep the rights of the citizens above all else."

Smart lighting has merged with a number of other smart solutions in society. What these solutions have in common are how they all connect with each other due to the accelerated deployment of sensors, networks and platforms. My job is to test how this connectiveness works and to make sure that these solutions in the end bring actual value for the citizens.

Because of this connectiveness, intelligent lighting holds a huge potential. By linking with sensors and other devices the lighting becomes far more flexible and adjustable, adapting to the level of light needed in a given situation for a given user. It then responds to car accidents, traffic jams, changing weather conditions, maintenance etc. Furthermore, it becomes possible to get a real-time overview of the actual energy consumption, making it easier to monitor.

However, these potentials are based on a huge amount of data and by crossing these data from different fields like passenger cars and cell phones combined with facial recognition, we occasionally end up with a surprisingly new set of information which brings an important pressure on privacy. This aspect becomes even more important when smart lighting and IoT devices begin to occupy our homes. Consequently when we as a public body install Human Centric Lighting and IoT devices in kindergartens, nursing homes, sport facilities and so forth, we have to strive for transparency and good communication.

In my opinion, citizens have the right to know why we might track their bike (to provide better lighting on the bike paths) or monitor people in a gym hall (to bring down the energy cost for the building). Consequently, we try to challenge ourselves by asking why we initiate the given data-driven project: will the technological solution benefit the green transition, a healthier everyday life for the citizens, or what is the actual goal?

In the end I believe flexible adjustable urban lighting will add much more value to our cities than we imagine. However the data-driven solutions will also change the way we work with lighting, and it is important for the public sector to be part of that transformation by asking the right questions and by keeping the rights of the citizens above all else.

Zoltán PAP | MANAGING DIRECTOR, BDK BUDAPEST

"The main challenge for cities is how to coordinate the whole process of development to becoming a smart city."

These days everybody is talking about smart cities, but are we smart enough to describe what we mean by a smart city? The ideas vary, approaches are different. Probably we have at least one aspect that we can agree upon: smart lighting is an important part of developing a smart city, but smart lighting is far from the only aspect.

The challenges are great, but it is also an opportunity: through smart lighting we can reduce energy consumption, decrease the CO_2 footprint of a city, we can adapt lighting to the needs of the local population (dimming in small hours, increasing lighting levels in case of an accident, adaptive lighting according to the traffic, or special needs, like ambiance), and we can rationalise the service costs through remote control options. And of course 5G is knocking on the door if not already entered the room. Lighting poles are optimal infrastructures for placing the 5G infrastructure.

As far as I am concerned, the main challenge for cities is how to coordinate the whole process of development to becoming a smart city, especially technologically. How to establish a city owned and coordinated IT infrastructure backbone with secure but open protocol systems, one that ensures all stakeholders access in a free and competitive way, and one that takes into consideration the needs of the city, the service providers and the citizens. In most cases cities cannot afford it financially. Without this wide IT infrastructure, a city cannot supervise and control the various aspects of different stakeholders, and it results in isolated and parallel – therefore inefficient – structures.

Regarding only lighting itself, there are as many questions and challenges as there are cities. There are significant differences between cities, for example:

•The ownership of the infrastructure (cable network, poles, luminaires) varies greatly between the city, the electricity provider, or both jointly.

• The different stages of development of the lighting system, ranging from Mercury, HPS, fluorescent lamps, to LED, all in different ratios.

• Differing physical conditions of the network, ranging from brand new low voltage cables with glass fibre optics, to 50-year-old paper covered cables.

• Varying approaches to 5G, needs for e-mobility and smart poles.

• Whether there is 0-24hr access to electricity on public lighting networks or access only during lighting operating hours.

• And the main issues: lack of financing and short-term priorities instead of long-term perspective thinking.

The Municipality of Budapest has approved a framework strategy for developing a smart city that intends to coordinate the co-operation of all stakeholders, focusing on a proactive city governance, smart people, smart economy, sustainable resource management, smart mobility and quality of city life.

Konrad DRESSEL | LIGHTING PLANNER, LIGHTING DEPARTMENT, CITY OF LEIPZIG

"More complex brings more performance, but also more vulnerability."

Today, the word "smart" seems to divide the "cool" people from the "not so cool" people, similar to the well-known musical "West Side Story" with the rivalling group of the "Jets" and the "Sharks".

As the Department of City Lighting in Leipzig, we consider the many ways in which we can be prepared, but this questions the word "smart" itself. So what is the objective of smart lighting? – In our understanding, it means to have a clear overview of one's equipment in terms of control and maintenance. We have developed a central control on our own for the more than 50000 lighting points all over the city. Combined with the established luxData-System, we know all relevant information like mounting date, last maintenance, lamp type and many more – each with GIS-reference.

We constantly seek the most efficient technologies in luminaire and lamp design, such as discharge lamps with sodium, later with halogen and now LED. The simple usage of LED itself (please note, without cloud-based "intelligence") is able to roughly halve the power consumption of each street retrofitted from luminaires with discharge lamps. Each feature that can be added to the luminaire means a lot more devices to manage (interfaces, protocols etc.), all of which raise the costs, but do not make much additional impacts on decreasing energy consumption.

Now the most important and most difficult issue to catch in this discussion: TIME. The lifespan of a luminaire installation is planned for about 25-30

years. This will not really fit with the fast-moving nature of products nowadays.

We as the Department of City Lighting have to ensure the functioning of an infrastructure. In this context we have to see it in this way: more complex brings more performance – but also more vulnerability. Which company can truly guarantee a product support over decades? Today, a luminaire is as complex as your smartphone, notebook, or tablet. That means the manufacturing process of this product(s) has many steps in its value chain, needing energy.

To be really "smart", the installation of a new technology first and foremost therefore should last long - and not need to be replaced due to lack of support and/or the question of suitable spare parts before the lifespan has ended.

We have to follow and keep up with the upcoming trends and standards of modern lighting, but we also have to look further than the pretty and "smart" looking (and in this manner promoted) luminaire itself.

Terje **RYGH** | ADVISOR SMART CITY, CITY OF STAVANGER

"We will be more successful if we can move from proprietary systems to non-proprietary systems."

A challenge many cities face while working with smart urban lighting are the many proprietary solutions in use, and therefore a lack of data ownership. We will be more successful if we can move from proprietary systems to non-proprietary systems. The public sector needs to own its data to enable innovation-making open data available. Without the ownership of data and use of open standards, we risk vendor lock-in and reduced space of opportunities. Data stored in fractured or inaccessible locations, where one often needs to buy access to it is, at best, slowing down the innovation processes.

The City of Stavanger recognises the importance of making lighting solutions interoperable, and we need the appropriate standards. Solutions need to build on the principle of universal design.

Regulations, physical locations, the at-the-time available technology, cyber and data security, GDPR and the environment in which we operate will also play a significant role in how big our "room of opportunity" actually is.

For the cities, in order to reduce the cost and mitigate environmental footprints, our citizens and the stakeholders need to be involved in a co-creative way.

In the current work, we see that this is very much a balancing act between intangible and tangible objectives. For smart cities to be able to solve the real problems individuals and society have around lighting, we need to know what those problems are. How can we know our citizen's lighting needs, if we have not asked them? Therefore, we need to consider human factors. We need to ask why, for whom, and why we do this continuously. Yesterday's problems may not be the problems of today. Generally, to solve smart urban lighting problems, we need to have the means, devices and tools to quickly evaluate if we are building solutions that solve real problems for our cities and our citizens. In an urban lighting point of view and from the viewpoint of Stavanger smart city, digital twin(s) will be an essential tool to solve future challenges.

Using digital twins not only lets us build many virtual solutions and models but also enables us to shift between them quickly. With the help of a digital twin, citizens and lighting experts can test the different setups and provide an easier way for them to choose the right end-product. A digital twin also enables the up-scaling of such tests if enough, and correct data is available through digitalisation. These twins can also be shared with other cities, making it easier to share setups, play with changes, and seek inspiration from other cities. In other words, they can act as an interactive walk in a virtual 3D demo.

If done right, the cost of doing small prototypes and quick testing in a digital twin can save the city "money, sweat and tears." If only one out of ten prototypes are a success, the one success may cover the cost of all the other tests. The goal must be to solve the actual needs of the city in a sustainable and cost-efficient way.

PERSPECTIVES FROM CITY PARTNERS

Louis-Frédéric ROBIN | DIRECTOR IN CHARGE OF CITIES & INFRASTRUCTURES, PUBLIC LIGHTING & SAFETY SOLUTIONS, ENGIE

"Connected street lighting opens the scene for other smart city applications."

In my opinion, the main opportunity linked to smart urban lighting is to really position this infrastructure as the neuronal backbone of the city. Given its integral superposition with the city, placed close to citizens and their facilities, the lighting infrastructure will unlock the "smart city" potential providing energy and support as required by the territory.

Public lighting is often seen as a door opener to smart cities for two main reasons. First, important energy savings from LED retrofits can finance investments to update other services. Second, connected street lighting provides a connectivity network on the scale of a whole city able to host other city applications, mutualising costs, resources and allowing the interconnection of systems at data level.

The development of IoT technology is expected to shape the future developments of smart street lighting with a wide range of sensors and devices able to communicate wirelessly over the Internet.

In addition, extra services can take advantage of the LPWAN network created for streetlight management. For example, sensors could allow to collect waste bins only when they are about to be full and energy smart metering to optimise grid management and billing.

On the other hand, a more digitalised city generates more data. And data processing can introduce new perspective in city management and reveal new information. For example, data on attendance levels and people behaviour analysis can help identify most attractive parts of a city and select interesting locations for advertisements. As the competition between cities is more and more intense, creating a real experience by adding new technologies and services (WiFi access points) through the public lighting metropolitan area network (MAN) and grid will attract visitors, citizens, students and companies.

A main challenge before all this however, will be interoperability. Lots of suppliers, lots of IT solutions could create a war of standards. To deliver and benefit the scale effect, the market will need a strong "push" and support from the various stakeholders to generate a convergence into an open standard to really unlock all the features of smart lighting in cities.

Pierre-Emmanuel RICHEZ | DIRECTOR, VINCI ENERGIES FRANCE (OMEXOM)

"This is an opportunity to respond to environmental challenges."

The COVID-19 crisis, combined with extreme climatic events, has raised governments' awareness of the urgency to accelerate the energy transition. From a societal point of view, this situation has led citizens to question their lifestyles and switch to more sustainable consumption by favouring locally produced goods. The limitations on human travel is encouraging users to refocus on where they live, on their own town or city. They are hoping for more pleasant and "sensitive" places to live. By sensitive we mean a territory that reflects the feelings and perceptions of its inhabitants, who aspire to an urban lighting design that is high quality and serene - conducive to the rediscovery of their territory. During the health crisis, many local authorities have shown their support for healthcare personnel by modifying urban lighting to highlight monuments in blue, as was the case for the Tours City Hall, which we created with smart lighting solutions. In this way, the lighting atmosphere is a sign that makes sense and smart lighting is here not to be seen as technology but as an important vector of communication and inclusion.

There are numerous opportunities: adapting the quantity of lighting, grading the quality of lighting according to seasonal use while taking account of the need to respect biodiversity or using light as a communication tool with LIFI.

Therefore the main issue is the wise and appropriate use of smart lighting. Public investment must be adapted to provide appropriate uses for the benefit of the territory and its inhabitants.

Our ambition is to do something useful - to suggest that territories reinvest energy savings

in dynamic city-centre projects. We want to capitalise on our expertise and our adaptability to take the measure of this change so as to offer cities the opportunity to reinvent themselves in the light of environmental challenges.

The challenge will be to respond as closely as possible to the needs of the cities and their residents and as quickly as possible. And we are aware of this paradigm shift.

This is an opportunity to respond to environmental challenges through global energy performance markets, while also taking up the challenge of making our cities more attractive and sensitive with an urban space that is enhanced by light.

Nicolas **KEUTGEN** | CHIEF INNOVATION OFFICER - SCHRÉDER

"Creating truly smart cities: why interoperability and governance matter."

Many cities worldwide have already reduced their energy bills and carbon footprint by switching to LED technology. By integrating a control system to their network, they generate further energy-savings and deliver a better citizen-centric experience.

What appears to be a simple retrofitting operation can actually lay the foundation for a smart city. Indeed, smart street lighting enables cities to do much more than light – it can transform a lighting network into the backbone of a smart city platform. While remote management devices allow city managers to communicate with each light pole, setting dimming profiles, generating reports and managing tickets, certain control systems also enable street lights to seamlessly interact with sensors and actuators installed throughout public spaces. Consequently, cities should envision their Smart City when opting to add controls.

After analysing thousands of projects of different sizes (through our dedicated R&D centre, Schréder Hyperion), we identified two main challenges that cities face when developing a Smart City Vision based on existing lighting infrastructure.

The most pressing challenge is to push for the adoption of open and interoperable solutions amongst smart city suppliers and stakeholders. As the technological landscape continues to evolve, only the deployment of open solutions will solve existing and future needs. Interoperability will help prevent the so-called "vendor lock-in" trap that ultimately impedes the development of smart cities. Such a strategy will also facilitate a more open and competitive market, while encouraging common standards to be adopted across industries.

Secondly, the internal processes of cities are seldom set-up for transversal application management or data and infrastructure sharing. Indeed, as the light pole becomes the main host for multiple digital applications serving various administrations, questions arise for example on which budget to draw from or which department is responsible for the maintenance.

By setting up living labs – deploying smart city applications in a delimited area – and involving all of the city's public service departments, the transformation process that leads to the comprehensive transversal management of smart city infrastructure can start.

With these projects, cities effectively support openness, verify interoperability, acquire knowledge and set the basis for public policies that address their local challenges and opportunities pragmatically while respecting their identity.

Reflection & Refraction
of life and light

Prof. Brian Evans, Glasgow's first ever City Urbanist, reflects upon today's changing world.

For those sufficiently free from immediate concerns and life challenges, these are times of reflection on the consequences of the coronavirus pandemic, the climate emergency and the actions of those who would belittle these challenges – or worse deny them.

Glasgow is a northern maritime city – its climate famously wet and unpredictable as a consequence. But in the dark and the wet, Glasgow can become a magical city of reflected and refracted light. Where lights are reflected back from the dark Caithness flagstones of the squares, spaces and streets of our city. When falling raindrops can sparkle like a larger version of the millions of tiny diamonds of powder snow that fall in the far northern frozen sunshine of late winter and early spring.

"In the dark and the wet, Glasgow can become a magical city of reflected and refracted light."

In the dark and wet, Glasgow reveals its true character of gritty urbanity. There is nothing quite like the reflection of neon, the hire lights of the black taxi fleet to announce that this is a real city – metropolitan in character and scale.

Reflection from wet surfaces does something else to light … it refracts, blurs and fragments light like the most famous refraction of them all – the rainbow. This refraction, this 'bending' of light, provokes a human response to the reflection that in itself provokes contemplation. And so, it is that COVID-19 has refracted our perceptions of where we are as urban societies, affording and forcing the opportunity for reflection of where we find ourselves and how we live.

We have seen many years of societal change transpire in as many weeks and months. Responding to immediate threat to health by increased physical distancing, losing out on the immediate human touch and on social cohesion replaced with isolation and longing. It has had very real effects on the functioning of our cities – the high street, the real estate market and how much office space we now need. There has been a massive impact on travel – where modal split between public transport and the car has gone into reverse.

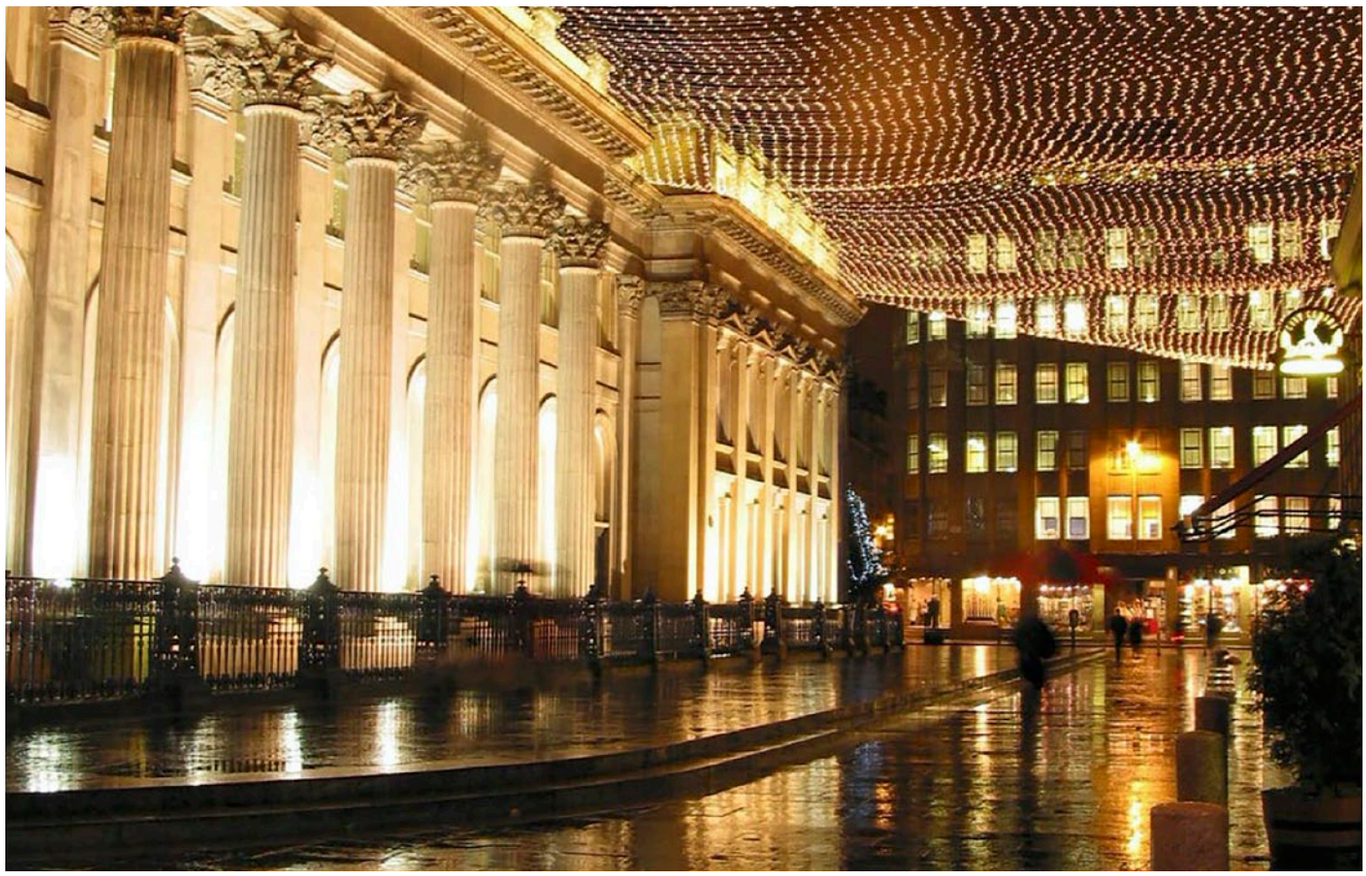
According to the psychologists, human beings are hard wired to deal with immediate threats and much less able to deal with equally existential longer-term threats. But as the shadow of COVID-19 lengthens and the aperture for dealing with the climate emergency narrows, these challenges become conjoined.

These then are the forces of change and of angst in the zeitgeist – the spirit of the times – that we find ourselves in. And yet, the genius loci – the spirit of the place of our home cities, 'heimat' in German and 'dualchas' in Scots-Gaelic – a belonging and longing for place remains the same.

In these refracted times we will spend more time in our home cities as we emerge from the pandemic. And we will need to find more and better ways to maximise the resilience of our cities on one hand to deal with the refractions in our culture and society on the other.

And so, it will be for light. Light needs to reflect – that word again – the spirit of the place. No point then in trying to enhance a northern, wet, maritime Celtic city with the light of a Mediterranean evening or the austere artic or hot desert hues but rather in a way that is appropriate to the wet and the dark – where reflections may reveal the character of the place and its people and where the manner whereby the light is used may also reflect the refractions of culture, society and economy we have lived through.

In Scotland, our darkest, shortest period of light comes the month before and the month after the winter solstice when, even by day, light levels may be low beneath layers of impenetrable rain clouds – so different to the pink twilight of the



Glasgow Royal Exchange Square

arctic when, below the horizon, the sun casts a pink hue of sunrise that blends into sunset before the dark, profoundly silent and clear arctic night. In Glasgow, we have a grey light and sibilant night is frequently accompanied by the characterful splish, splash and murmuring of running water. Into this grey, murky daylight and sibilant, dense darkness, light can be a magical, restorative and transformative source of joy and inspiration.

In Scotland, this period is bookended by two significant cultural events in our calendar – St Andrew's day on 30 November and the birthday of our national poet – Robert Burns on 25 January. I have long advocated a festival of light between these dates that might enhance the night, give character to the day, in a subtle way, as an aid to living – the state of being – in these dark months of wet, grey and dark winter days. An initiative that may be further enhanced with more exciting and joyous light over Christmas and celebration of hope over the new year period – switched on at the end of November to act as comfort in the two darkest months and switched off at the end of January when, fortified by our Burns Suppers, we may savour the days as each one lengthens at first imperceptibly and then accelerated as we speed to the spring equinox and a return of the long summer days of hope.

"Light can be a magical, restorative and transformative source of joy and inspiration."

Refract | *ri'frakt* | *verb [with object] (of water, air, or glass) make (a ray of light) change direction when it enters at an angle: the rays of light are refracted by the material of the lens.*
Measure the focusing characteristics of (an eye) or of the eyes of (someone): when refracting patients an ophthalmologist relies on verbal reports.

Refraction | *ri'frakʃ(ə)n* | *noun [mass noun] Physics the fact or phenomenon of light, radio waves, etc. being deflected in passing obliquely through the interface between one medium and another or through a medium of varying density.*
Change in direction of propagation of any wave as a result of its travelling at different speeds at different points along the wave front.
Measurement of the focusing characteristics of an eye or eyes.

Rainbow | *ˈrembəʊ* | *nounan arch of colours visible in the sky, caused by the refraction and dispersion of the sun's light by rain or other water droplets in the atmosphere. The colours of the rainbow are generally said to be red, orange, yellow, green, blue, indigo, and violet: all the colours of the rainbow.*
A display of the colours of the spectrum produced by dispersion of light.
*A wide range of related and typically colourful things: **a rainbow of** medals decorated his chest.*
[as modifier] many-coloured: a big rainbow packet of felt pens.

In the works

Co-creating urban lighting solutions in times of COVID-19

Partners of the Interreg Baltic Sea Region project Lucia – Lighting the Baltic Sea Region put a strong emphasis on co-creation in their cities. What have they learnt so far?

Giving local residents the opportunity to take part in urban lighting planning processes is a clear priority for the cities that work together in the framework of the Lucia – Lighting the Baltic Sea Region project. *"There is no doubt that in designing the urban environment, we should ask the opinion of the end-user of this environment, in particular,"* says Eva Tallo, Chief Specialist at the Urban Environment and Public Works Department of the Estonian capital Tallinn, one of the Lucia partner cities.

As planning processes are getting more and more complex, public administrations have moved from a traditional and hierarchical definition of value to more participative and user-centred processes where people, administrations and other organisations jointly generate solutions and meaning.

From the perspective of cities, lighting is a subject that is particularly suitable for implementing co-creation as light appeals to people's emotions. The Lucia project's approach to co-creation is two-fold: on the one hand, Lucia partner cities invite residents and other stakeholders to actively participate in planning and realising the six pilot projects in Lucia cities. On the other hand, co-creation in the project is also about spreading knowledge and enthusiasm about light. For Hamburg's Borough of Altona, this aspect is particularly important. *"We want to foster a holistic understanding of lighting, for example by discussing the topics of light pollution and perceived safety of public spaces with our citizens,"* says Heike Bunte, Lead Partner of the Lucia - Lighting the Baltic Sea Region project.

Feeling the light

Although light touches us all, we do not necessarily know exactly what type of lighting we want and need for specific urban areas. This is something public surveys and questionnaires often reveal. Temporary light installations and actions that invite people to experiment with light can be a fun and low-threshold way of engaging with citizens and fostering a deeper understanding of light and its impact on the urban environment and us. *"You have to feel the place to understand,"* says E. Tallo from Tallinn.

Brighter = safer?

It is often argued that public co-creation processes most often lead to citizens demanding more and brighter lights – to increase the perceived safety of public spaces. Experiences from Lucia partner cities do not confirm this assumption. In Hamburg, the redesign of a tunnel at the Lucia pilot site has led to a significantly higher perception of safety among users,

Dealing with the COVID-19 pandemic

Traditional co-creation formats – such as workshops, meet-ups and other types of gatherings that require personal contacts – have been limited by the restrictions imposed due to the COVID-19 pandemic. This is how Lucia partners tackled this challenge:

- Tallinn and Hamburg have both set up map-based questionnaires and online surveys to collect citizens' and users' perspectives and opinions.
- Porvoo even ran a vision workshop with citizens and other municipal stakeholders online.
- Porvoo and Hamburg also switched to outdoor events such as lighting walks under strict regulations on safety distance, limitation of the number of participants, and hygienic measures.

according to surveys and interviews. This increased perception of safety has, however, mostly been achieved by a new tunnel decoration with paintings on the tunnel's walls, and not primarily by the new luminaires installed.

The city of Tallinn has made similar experiences: *"In our case, we were happy to discover that most people were really well-informed and said that good lighting in parks is calm, cozy, balanced, moderate, soft, avoids light pollution and protects ecosystems,"* says Eva Tallo.

Co-creation requires time and resources

Co-creation processes might lead to completely different ideas and solutions than lighting planners and managers originally had in mind. And that's not all: political decision makers and community leaders might not always be willing to approve the co-designed solutions – in particular if they exceed original project budgets or differ too much from aesthetic or planning traditions. This is something the Lucia partners in both Tallinn, Estonia and Jūrmala, Latvia have experienced. Their learning from the Lucia project in this regard is: Co-creation requires even more time, financial and staff resources in future projects and should involve relevant municipal departments already in early phases.

Three questions for Heike Bunte, *borough of Hamburg-Altona, Lucia lead partner*

The COVID-19 crisis has challenged the participation and co-creation formats we are used to working with. Where do you see positive sides of the current crisis in that respect?

Heike Bunte: I see the biggest value in investigating in new and additional digital instruments. It is a unique chance to develop this. I wouldn't say that the traditional forms are not worth working with, but there is a real need to bridge the gap between different generations and to involve target groups other than "the usual suspects" in our work. COVID-19 has accelerated this development and taught us to develop additional capacities.

How can we make sure that we capitalise on these experiences in post COVID-19 times?

Heike Bunte: Currently we are learning how to develop and how to use these new forms of digital co-creation. Additionally we are also getting (online) feedback from people on what they liked about these tools or not. This is motivation enough to invest in further thinking. For example, we noticed that 3D modelling has had absolutely fascinating ways of creating urban places in a very detailed manner.

What else needs to be done to strengthen co-creation processes between research and practice?

Heike Bunte: I would love to see a much closer co-working atmosphere between research/science and practitioners in the field. While both sides equally accept the strengths and knowledge of the other side, many digital forms and tools are currently developed in parallel. We need to synchronise these parallel processes better and need to exchange our ideas and visions. Last but not least: it's also worthwhile and should be allowed to ask whether co-creation and participation are always useful and fruitful. I would also love to see an honest discussion on the limits of co-creation.

Read the full interview online on the LUCI website

Lucia Resources

The project Lucia – Lighting the Baltic Sea Region is funded by the Interreg Baltic Sea Region Programme. Project partners help municipalities in the Baltic Sea region unlock the potential of energy efficient urban lighting solutions. The project provides decision makers and experts with state-of-the-art lighting knowledge, covering aspects of environment, technology, economy, social acceptance, urban planning and green public procurement.

The Lucia project has a large collection of factsheets, the Lucia Compendium, Lucia reports and tools. A new report featuring lessons learned on co-creating urban lighting solutions will soon also be available.

Find them here: www.lucia-project.eu.

LUCIA Interreg Baltic Sea Region EUROPEAN REGIONAL DEVELOPMENT FUND EUROPEAN UNION

New LUCI members

PESSAC | France

Pessac (pop. 64 000) is located in the urban area of Bordeaux, a dynamic and attractive region in the south west of France. It hosts a large university campus attended by more than 60 000 students from across the region. Although highly urbanised, the city has preserved some prestigious vineyards, producing high-rated red and white wines.

The municipality has 10 000 lighting points, most of which are switched off between 1:00 a.m. and 5:00 a.m., to fight against light pollution and energy waste. The city has put in place specific measures to warn about and compensate for the absence of lighting (signs, markings, reflective devices, etc.).

www.pessac.fr

PORTO-NOVO | Benin

The Municipality of Porto-Novo, capital of Benin, is located on the edge of Lake Nokoué and is characterised by its young population of 223 000 inhabitants. Porto-Novo, a UNESCO Creative City, is a cultural, touristic, and historical city open to the world, whose relics of the past are still present.

Today, the city is undergoing major public works, with the deployment of new roads and lighting infrastructure. The ultimate objective is the replacement of conventional streetlights with solar LED streetlights. It also aims to install intelligent solar streetlights in public squares and other important public spaces.

The city is also in discussions for the implementation of a festival dedicated to sound and light, inspired by the Fête des Lumières in Lyon, a partner city of Porto-Novo.

Welcome to the new LUCI associated members

- **AUDACIOUS** | UK
- **ECLAT LIGHTING INITIATIVE** | Canada
- **EASTCO LIGHTING DESIGN** | China
- **LOUIS POULSEN** | Denmark
- **LYSE LUX** | Norway
- **INTERNATIONAL NIGHTTIME DESIGN INITIATIVE** | USA
- **NOOR RIYADH** | Saudi Arabia
- **SCHRÉDER** | Belgium
- **YD ILLUMINATION** | China

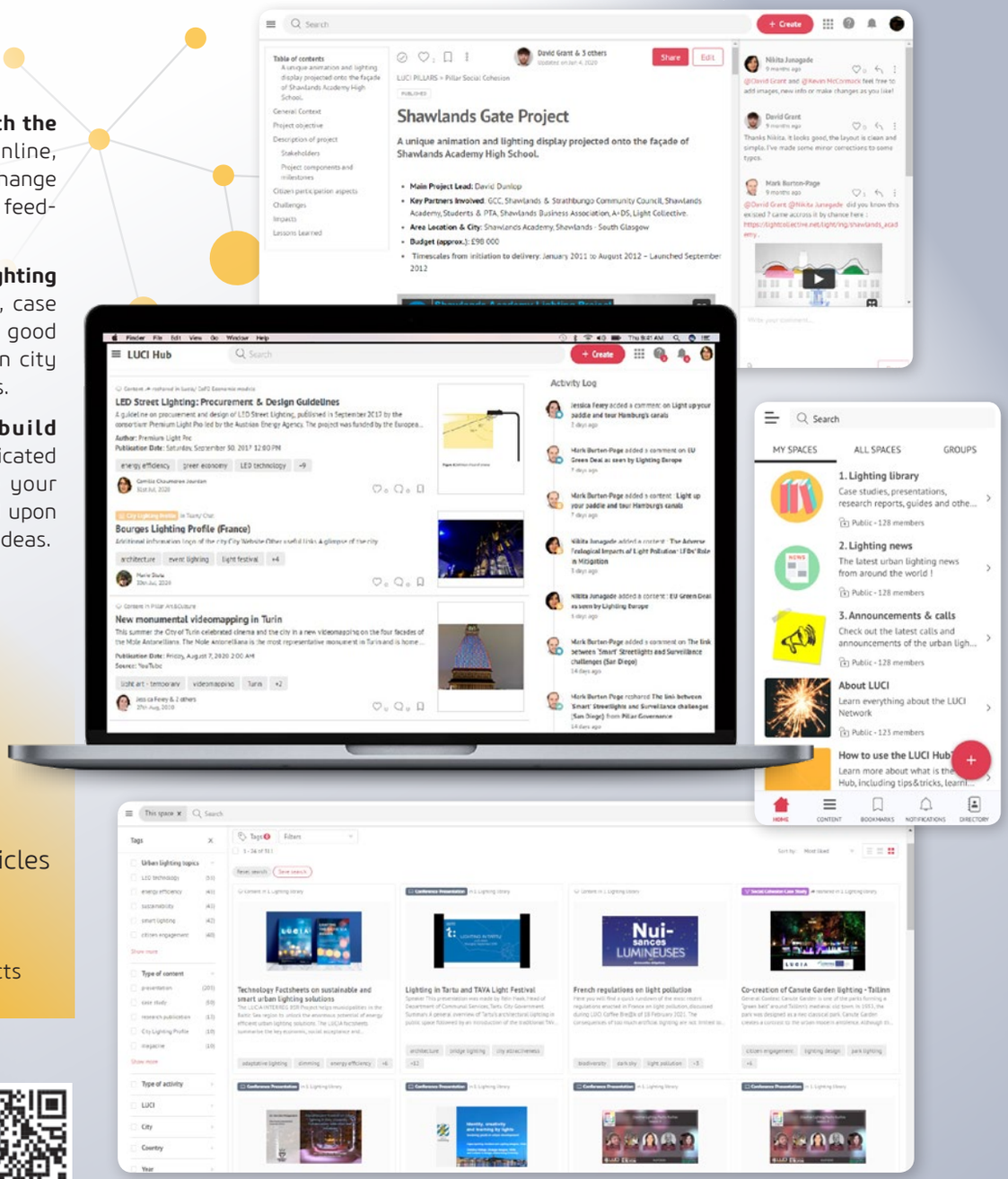
NEW for LUCI Members

The LUCI Hub

The LUCI Hub is the new online knowledge-sharing platform for LUCI members.

The LUCI Hub is:

- **A social space to connect with the urban lighting community** online, create new conversations, exchange lighting projects, experiences, feedback, advice, and inspiration.
- **A resource centre on urban lighting** with lighting news monitoring, case studies, event presentations, good practices, reports and more on city lighting strategies and projects.
- **A collaborative tool to build collective knowledge** with dedicated thematic spaces to continue your discussions and help you build upon existing information with new ideas.



Today,
the **LUCI Hub**
already has:

50 case studies
and lighting projects

140 lighting news articles
and research reports

200 presentations on
lighting strategies or projects

LUCI members can request access here!

https://www.luciassociation.org/luci-hub-access-form/

LUCI People

Meet **Claus Petersen**

Project Manager/Urban Designer at the City of Stavanger

Place of Birth:
Sønderborg, Denmark

Educational background:

- BSc. Landscape Architecture and Urban planning (University of Copenhagen)
- Master in Urban design (Aalborg University)

I also hold a non-degree qualification in Graphic Design.

Previous roles:

In the department of Urban Planning and Development at the City of Stavanger I worked with planning of new urban areas.

Before working for the City, I worked as a landscape architect at Ramboll Consulting in Stavanger.

Time at current role:

Almost 5 years.

Your main responsibilities and tasks at work are: I work in the Urban Environment and Development department as Project Manager for projects in the city centre of Stavanger. I work on the overall planning and on strategies such as the light plan for the Stavanger city centre. Similarly, I have worked on an urban space strategy for Stavanger. I also do a number of smaller scale projects that focus on urban spaces or streets. And of course, I now work a whole lot with lighting projects: landmarks, cathedral/churches, urban spaces and streets.

The urban development & lighting team in Stavanger is: The City of Stavanger doesn't have its own lighting department or a person with overall responsibility for lighting. I work in a project office with landscape architects, urban designers and engineers. We all work on outdoor areas in the city – everything from parks, schoolyards, streets, public squares etc. where each person typically is responsible for lighting in their projects. We collaborate closely with the organisation Lyse Lux which operates and maintains all public lighting in the region.

The key ingredients of a successful lighting project in the public space are: Public/private collaboration or co-creation with user groups is vital, especially when working in the historical city centre. To me, this is the key to success in a lighting project. I recommend staging wide and transparent processes for all actors that might have an interest or stake in the location and project.

In an ideal world, the most appropriate lighting solution for Stavanger would be: A full sensor-controlled and self-evaluating LED lighting system that can adapt to the situation and demands in each area.

A new development that has changed how Stavanger uses light in urban space is: It is new to involve a wide range of user groups when we plan for new lighting. In the work with the light plan of the city centre, many actors were involved in the process. This provided insights that led to decisions that would likely not have been made if we had not run such a process. For example, on the issue of enhancing the feeling of safety in the nighttime, we got some very important inputs from youth organisations.

The best part of your job is: I enjoy the processes of co-creation with user groups and private actors. That is the part of the process that I find the most innovative and where the opportunity to create something unique together exists.

An international lighting project that has impressed you: I enjoy visiting light festivals. The last one in Oulu, Finland during the LUCI City under Microscope, stands out as a great experience for me.

A city that inspires you for its overall lighting is: I am inspired by Ghent, Belgium. Especially how they have lit up the old medieval harbour front. We are working on lighting plans for our own historical harbour. Hopefully we can do something that is as good as in Ghent.

Your professional goals for this year ahead: In 2021, a political decision was made determining that Stavanger shall be the frontrunner in Norway in the matter of reducing light pollution. We will have to make an action plan for how to solve this. It is a major task for Stavanger, but I am very excited to be working on something like this.

Besides light, you are passionate about: I am passionate about rethinking the role of city centres and developing them. Many cities around the world have experienced how housing, offices, shopping and other functions have moved out from the city centre and how, as a consequence, the city centre has lost its historical role. This a common problem in many places, and now it is time to rethink their present and future role. On a personal level I am passionate about spending time with my daughter and my newborn son. In the limited free time I have, I play squash, go hiking, and take photographs. COVID-19/home office times also made me become a hardcore sourdough and barista nerd!

Finish the sentence: "Light in the city is..." a continuous process of testing and evaluating!

LUCI *recommends*

Read

Lucia lighting economic assessment tool

Produced by the partners of the "Lucia – Lighting the Baltic Sea Region" project, the Excel-based tool aims to help municipalities in indicative assessment of economic and environmental impacts related to investments in public outdoor lighting.

Download the tool

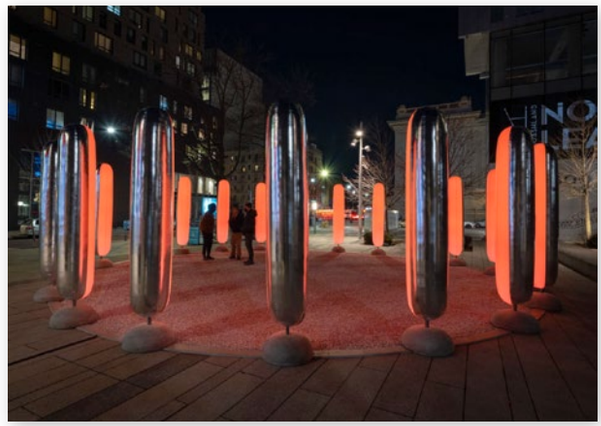
https://bit.ly/3yJJWrT

Experience

Breathing Pavillion | New York

A new interactive public art installation in Brooklyn, Breathing Pavilion by artist Ekene Ijeoma encourages passers-by to take the time to breathe in these challenging times. It comprises a 30-foot circle of twenty, nine-foot-tall, two-tone inflatable columns that slowly modulate in brightness to illustrate a deep breathing technique designed to bring calm. Viewers are invited to breathe in time with the changing light to center themselves in a communal rhythm of respite.

More details



https://www.vanalen.org/projects/breathing-pavilion/

Watch

Lyon Light Festival Forum 2020

Couldn't participate in the Lyon Light Festival Forum 2020 organised by LUCI and the City of Lyon last December?

Watch these videos with:

- 5 hours of recording
- 2 panel discussions
- 8 Pecha Kuchas
- 7 LUCI member cities

Watch the videos

https://bit.ly/34p9759

SMART-SPACE webinar series

Watch these three videos from the SMART-SPACE project partners focusing on the potentials of smart public lighting in mid-and small size cities.

Watch the videos

https://youtu.be/60F8D8Xffdw

Every third Thursday of the month

LUCI Coffee Bre@ks

ONLINE 10:00 - 10:30 CEST *(exclusively for LUCI members!)*

The LUCI Coffee Bre@ks are the new monthly rendezvous for LUCI members: every third Thursday of the month features a 30-minute spotlight on a lighting project or topic. Take a break from your day and catch up with your LUCI friends and colleagues in the LUCI Coffee Bre@k every month!

27 - 30 October 2021 — TARTU (Estonia)

Annual General Meeting

Key event of the LUCI calendar and the only international forum for cities on urban lighting, the LUCI Annual General Meeting (AGM) will feature plenary conferences, panel discussions, and open conference sessions on new lighting trends and projects from cities worldwide.

The City of Tartu in Estonia will be the host of the event, showcasing its recent urban lighting projects as well as its light festival TAVA – Tartu in Light.

Given the current context and travel restrictions due to COVID-19, the LUCI AGM 2021 will be a hybrid event, on-site and online.

October 2021 — SEOUL (South Korea)

LUCI Asia Urban Lighting Workshop

City representatives from Asia and beyond are invited to join this free online event organised by the City of Seoul and LUCI to discuss urban lighting trends and challenges in the region.

December 2021 — LYON (France)

Lyon Light Festival Forum

Each year, in conjunction with Lyon's world-renowned Fête des Lumières and in partnership with the City of Lyon, LUCI organises the Lyon Light Festival Forum (LLFF). City representatives, artists and lighting professionals from around the world are invited to join this unique event to discuss and debate about new forms of creative lighting. Be sure to join us!

OTHER EVENTS

↗ **"Lucia – Lighting the Baltic Sea Region" project final conference**
22 - 23 September 2021

↗ **ENLIGHTENme "Shaping light for health and wellbeing in cities" conference**
16-17 December 2021

Stay tuned for more details at www.luciassociation.org

Don't miss these upcoming light festivals

Chartres en Lumières
10 April - 31 December 2021

Jyväskylä City of Light
23 - 25 September 2021

More details in the LUCI Light Festival Calendar at www.luciassociation.org

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69 member cities

- Abomey (Benin)
- Agii Anargiri-Kamatero (Greece)
- Albertslund (Denmark)
- Amsterdam (The Netherlands)
- Antwerp (Belgium)
- Batumi (Georgia)
- Bharatpur (Nepal)
- Bourges (France)
- Brussels-Capital (Belgium)
- Budapest (Hungary)
- Busan (South Korea)
- Chartres (France)
- Chefchaouen (Morocco)
- City of London Corporation (UK)
- Copenhagen (Denmark)
- Dakar (Senegal)
- Dubrovnik (Croatia)
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- Glasgow (UK)
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- Guangzhou (China)
- Gwangju (South Korea)
- Hamburg (Germany)
- Helsingborg (Sweden)
- Helsinki (Finland)
- Ho Chi Minh (Vietnam)
- Hue (Vietnam)
- Jericho (Palestinian Territories)
- Jinju (South Korea)
- Jyväskylä (Finland)
- Leipzig (Germany)
- Liège (Belgium)
- Linköping (Sweden)
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- Varna (Bulgaria)
- Yala (Thailand)
- Yerevan (Armenia)

55 associated members

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- Fluvius (Belgium)
- Omexom (France)
- Schréder (Belgium)
- Signify (The Netherlands)
- Thorn Lighting (UK)

Ordinary associated members

- A2A Illuminazione Pubblica (Italy)
- AdE Porto (Portugal)
- Agence ON (France)
- AMIRA JSC (Russia)
- Amsterdam Light Festival (The Netherlands)
- Artichoke (UK)
- Audacious (UK)
- Berlin Leuchtet (Germany)
- BIBI (France)
- Blachère Illumination (France)
- C2 Smartlight oy (Finland)
- Citelum (France)
- Cluster Lumière (France)
- Craig Morrison (UK)
- Creatmosphere (France)
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- Eclat Lighting Initiative (Canada)
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- Gate 21 (Denmark)
- GLOW (The Netherlands)
- Greenled oy (Finland)
- Guangzhou Guangya Messe Frankfurt Co Ltd (China)
- ILI - Intelligent Lighting Institute TU/e (The Netherlands)
- Illuminated River (UK)
- ILP (UK)
- Infomir (Switzerland)
- Innovision (China)
- INSA Lyon (France)
- International Nighttime Design Initiative NTD
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- Kaleidoscale (China)
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LUCI Association
13 rue du Griffon
69001 LYON - France

T: 00 33 4 27 11 85 37
luci@luciassociation.org
LUCIassociation

www.luciassociation.org