



# CASE STUDIES





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## **Case studies**

# Smart public lighting by using energy performance contracting (EPC)

## Smart public lighting - challenge and solution concept

Energy Performance Contracting (EPC or EnPC) is a form of 'creative financing' for capital improvement which allows funding energy upgrades from cost reductions/savings. Under an EPC arrangement, an external organization (ESCO) implements a project to deliver energy efficiency, or a renewable energy project. It uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment. Essentially, the ESCO will not receive its payment unless the project delivers energy savings as expected.<sup>1</sup>

The approach is formed on the transfer of technical risks from the client to the ESCO based on performance guarantees given by the ESCO. ESCO remuneration outcomes from demonstrated performance; a measure of performance is the level of energy savings or energy service. EPC is a mean to deliver infrastructure improvements to facilities that lack engineering skills, manpower or management time, capital funding, understanding of risk, or technology information. Cash-poor, yet creditworthy customers are, therefore good potential clients for EPC.<sup>1</sup>

Public lighting system can be easily recognized to have all above-mentioned characteristics. Besides, public lighting also plays a pivotal role in the development of most of the Smart City applications by providing physical and electrical infrastructure suitable for most of the Smart City sensors, communication and IoT devices, cameras, loudspeakers, displays etc.

In recent years, significant development has been invested in public lighting systems in order to enable maximum energy efficiency, minimum environmental load, high level of connectivity and embedded intelligence, as well as to enable it to function as energy and communications backbone for Smart City applications integrated in its infrastructure. There are various pilots and projects in modern cities worldwide tailored around integration of Smart City applications in public lighting systems infrastructure. This development goes further by learning and adapting the experiences gained from these projects.

In short, modern cities face the following challenges:

- energy balance ensuring;
- environmental sustainability;
- communication services development;



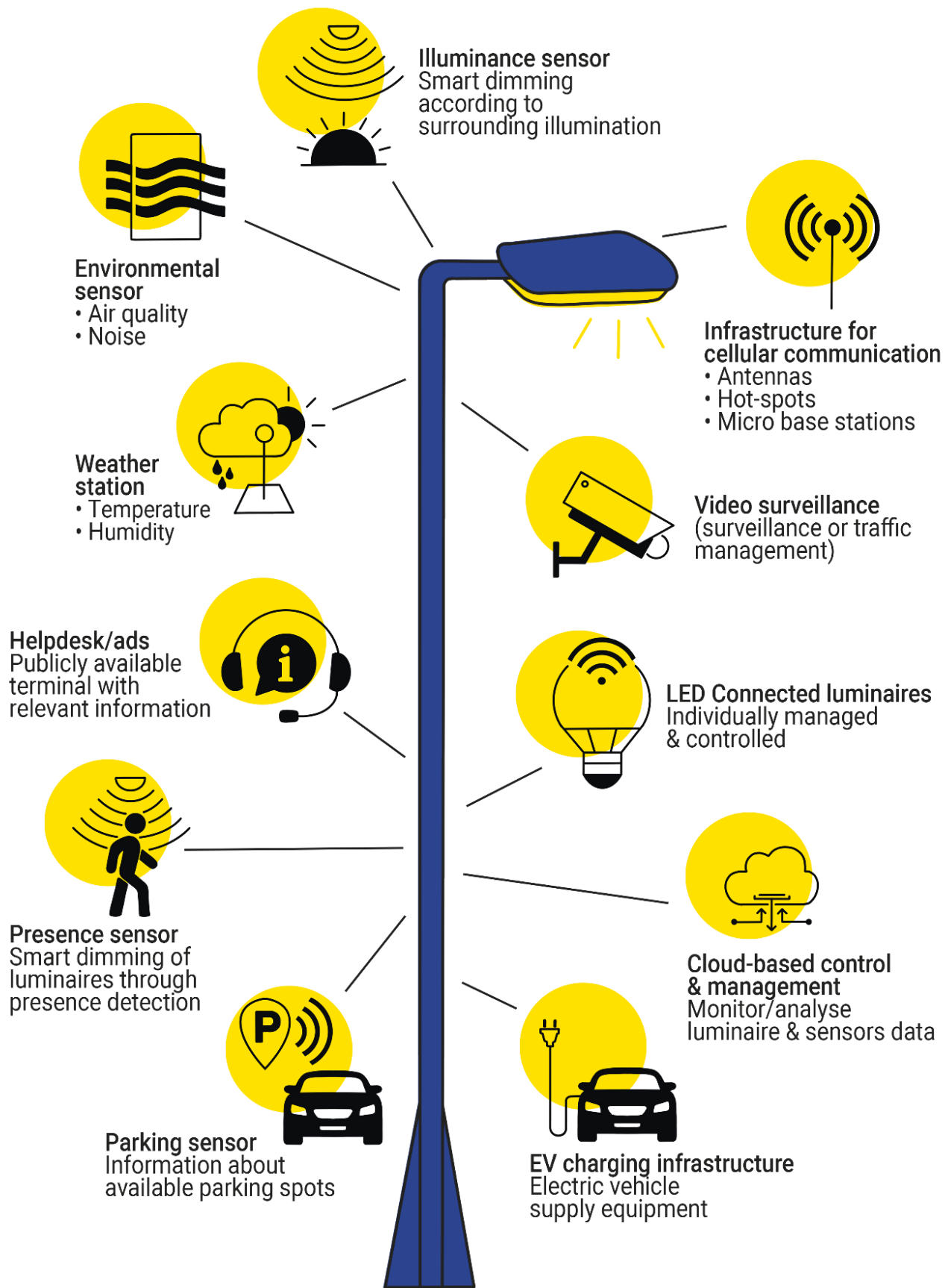
- city management operation;
- citizen well-being ensuring;
- global city branding and positioning.

**The key solution to address some of the above-mentioned challenges would be the upgrade of public lighting systems with LED connected luminaires.** However, some of the challenges need to be additionally addressed such as citizen well-being, city management and communication services.

Hence, the concept behind Smart EPC is to get the most out of the smart public lighting system infrastructure to be able to monetize on additional services such as Smart City applications, e.g. environmental monitoring (that would allow local authorities to work more efficiently on citizen well-being and to have basis for sustainable urban development plans), EV charging solutions to increase sustainable mobility and last but not least, Communication technologies, e.g. street level 5G base stations (that allow for more connectivity with no need for building and construction permits extraction and additional infrastructure).

The ideal case would be the following:

- connected public lighting system infrastructure powered by the standard grid;
- environmental monitoring equipment mounted on the lampposts to provide a grid of sensors that will give a clear picture (heat map) of air quality, noise level or temperature level (Smart City applications);
- EV charging solutions integrated within the lampposts;
- Communication technologies e.g. street side 5G base station solutions for mobile connectivity, mounted on lampposts.



## Solution overview

The prime purpose of modern cities is to provide a high level of well-being to their citizens while not deteriorating the environment of surrounding areas. This way, the city is well-positioned globally in everlasting competition with other urban centres worldwide.

The first challenge of modern cities is the sustainable balance of the total energy provided to the city with the one consumed by the city. This challenge gets more and more important each day. The other very important factor is environmental sustainability. A very important task is to reduce waste generation load by every system used in modern cities, especially the one related to hazardous and polluting substances. The other important aspect is the issue of light pollution in modern cities, affecting human health, stability of biological ecosystems and preservation of dark skies environment important to astronomical observation, the well-being of citizens and tourism. As much as the life of a modern person gets increasingly complex and multidimensional, the overall management of city life gets increasingly complex each year in all aspects. City management requires a complex and smart integrated IT backbone, open and interactive to citizens and all city management service organizations. City also needs to be interconnected with the whole country and global people, information, goods, and energy networks. This Management system needs to be a live and interactive flexible system growing, adapting, and developing with a city. **Citizen well-being means that city life is adjusted to citizens in terms of all their daily needs, sensing the life of the citizens, adapting to it and interacting with it.** The modern city needs to adapt to the daily rhythms and movement patterns of its citizens.

By providing a high level of citizen well-being and a healthy integration within its county and the international community, the city advances in its global positioning and branding. This is also highly interconnected with the spirit of uniqueness and creativity expressed by the city and its citizens. The better the city's global perception and positioning, the quicker prosperity of a city.

**Weather station**  
• Temperature  
• Humidity



**Cloud-based control & management**  
Monitor/analyse  
luminaire & sensors data



**Environmental sensor**  
• Air quality  
• Noise



**Helpdesk/ads**  
Publicly available  
terminal with  
relevant information

**Infrastructure for  
cellular communication**  
• Micro base stations  
• Antennas  
• Hot-spots



**Illuminance sensor**  
Smart dimming  
according to surrounding  
illumination



**LED Connected  
luminaires**  
Individually  
managed  
& controlled

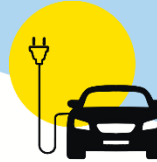
**Presence sensor**  
Smart dimming of  
luminaires through  
presence detection



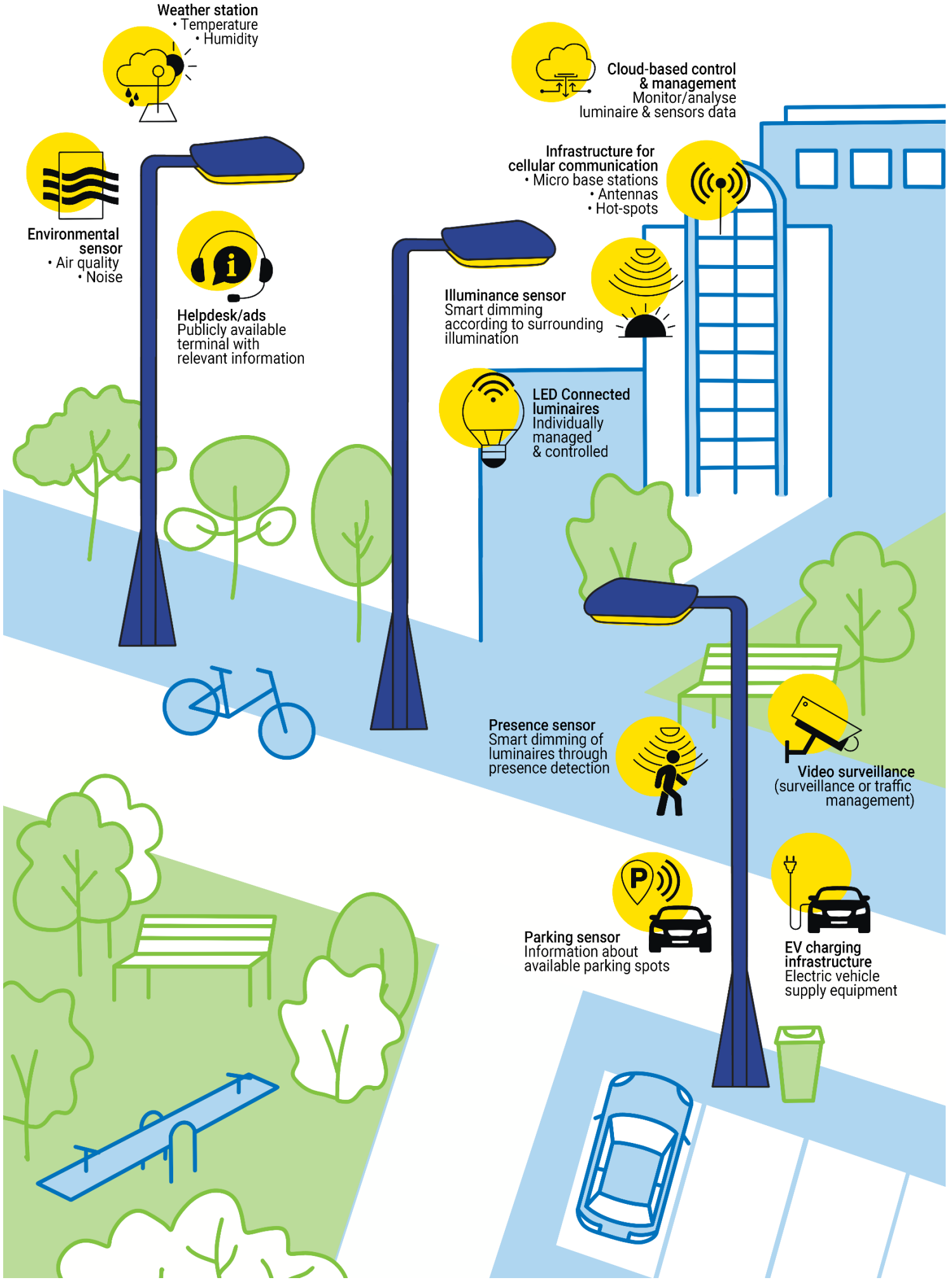
**Video surveillance**  
(surveillance or traffic  
management)



**Parking sensor**  
Information about  
available parking spots



**EV charging  
infrastructure**  
Electric vehicle  
supply equipment



## Challenges

When thinking about the complete solution (connected lighting with additional services infrastructure) common questions arise:

- how to secure power infrastructure for the additional services?
- how to deploy the additional infrastructure (sensors and 5G antennas) fast and simple?
- how to deploy non-intrusive infrastructure (EV charging points)?

The questions above present a challenge when trying to improve and enrich EPC projects. The case is that every available service, in addition to connected public lighting, has a set of rules for implementation that needs to be followed. Although installation of connected public lighting might seem fairly simple process, as it only envisions the replacement of traditional lampposts, it might be a complex project. [Detailed construction and development plans must meet the regulatory, legal and planning demands](#). Additionally, every additional service must consider the set of assumptions, prerequisites and constraints:

### Challenges - Street side 5G solutions

Communications service providers are challenged on the footprint, rent and OPEX of macro sites and those challenges are even more present at the street level. [New street and outdoor small-cell solutions can be mounted on existing infrastructure](#). They are fast to install, with a subtle footprint and secure the 5G experience. Delivering industry-leading innovations is no small feat in the mobile operators' industry.

The questions that arise with urban 5G roll-outs are:

- How to acquire sites with the minimum rental?
- How to deploy fast and simple?
- How to maximize the 5G user experience?
- How to deploy non-intrusive 5G sites?
- How to utilize all frequency layers in a best way?

As 5G network roll-outs continue globally, the need for network densification will continue to grow. According to the Ericsson Mobility Report 2016<sup>2</sup>, cellular data traffic was expected to grow nine times by 2020, placing a unique demand on mobile network operators to provide the necessary infrastructure and density required to serve the market. On top of this, operators are struggling to acquire new cell sites in public areas to provide the best possible mobile broadband coverage for their customers.

## Challenges - Environmental monitoring

Air pollution, often referred to as the "Invisible killer", is one of the biggest public health risks worldwide. According to Harvard University, the presence of harmful gases and particles in the atmosphere results in 8.7 million premature deaths per year, roughly 20% of all deaths.<sup>3</sup>

Tourism and travelling have become an important part of modern-day life, but they, among many positive, have a number of negative consequences. Environmental impact is probably the most obvious one. It consists of many different aspects, such as the depletion of natural resources like water and land, discharging waste, pressure on endangered species, noise pollution, carbon footprint and many others. One of the aspects, which is hard to notice at first, is the impact on the air quality.

When monitoring environmental parameters in urban areas, the following questions arise:

- How to deploy sensors fast and simple?
- How to secure power infrastructure?
- How to deploy non-intrusive sensors?
- How to utilize existing infrastructure in a best way?

**The importance of clean air is obvious when it comes to health and life quality, but research also shows its influence on tourist demand.** High levels of SO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and NO<sub>2</sub> have a strong negative impact on the number of tourists in that area.

## Challenges - EV charging

There are several reasons why the lamppost is in the spotlight for EV charging such as existing infrastructure, ubiquitous and common placement throughout most urban spaces. Public lighting systems are already connected to a power supply and, in residential areas especially, where space is at a premium, it makes sense to utilize street furniture that has already been installed, rather than further adding to street clutter.

A key reason that EV charging facilities are integrated into public lighting system infrastructure is that it is significantly cheaper than new on-street charge points and their connection to the power grid. This, combined with the drive for EV take-up where more electric cars are anticipated on the street, means the necessity for charging infrastructure to support it. Since pavements don't have the capacity to accommodate additional applications, public lighting holds the answer.

**The key challenge here is to separate the electric supply used for public lighting, other services and EV charging.** The architecture should be done in a way that it protects all the assets in case of failure or overload. Additionally, the EV charging stations should be integrated only at the locations where it makes sense to put a parking place for EVs to charge.

## Key benefits of additional energy and non-energy related services on public lighting

Given the assumption that the full stack service offering is available on a particular location, here is a list of key benefits per the service offered on top of the connected public lighting:

### Key benefits - Street side 5G solutions:

- Deliver street side solutions and leverage smart public lighting capacity and infrastructure to ensure 5G experience;
- Integrating into any streetscape with minimum visual impact;
- Increased broadband connection points;
- Detect failed lampposts;
- Low power consumption for sustainability goals.

**Overall, the case is that the owner of the smart public lighting infrastructure can benefit even more (financially) by giving into concession the infrastructure (lampposts),** which for sure is appealing to CSP's as they are mitigating the challenges faced when trying to deploy 5G base stations in a traditional way (own infrastructure).

### Key benefits - Environment monitoring

Installing various environment sensors (heat or air quality) on existing or connected lampposts solutions creates new service opportunities and allows city officials to create an ecosystem that will allow making informed decisions on improving the quality of life.

The results of such an integrated solution are:

- Integrating into any streetscape with minimum visual impact;
- Improving city life quality;
- Generate pollution heat maps;
- Low power consumption for sustainability goals.

### Key benefits - EV charging

Integrated EV charging points offer a cost-effective and creative approach to siting and installing public charging stations. In addition, they present an important tool that can help expand access to EV charging. The key benefit of implementing the EV charging into lampposts besides driving sustainable mobility (the key thing to achieving climate goals is to turn electric, but also it needs to be complemented by appropriate infrastructure) is also an **open position for a new revenue stream**. CSP's offering such services would probably be delighted to be able to place EV chargers by paying the concession to the existing infrastructure (lampposts).

In the next **case studies**, examples of pilot projects in the field of implementing energy and non-energy-related services on public lighting are given. The best existing solutions to emerging challenges have been described in detail, with focus on three different areas:

- Smart public lighting as the basis for Smart City applications:  
Paris (FR), Tampere (FI), Sabinov (SK);
- Smart City – EV charging as commercial energy service:  
Greater London (UK), Los Angeles (US);
- Smart City – Communication technologies as commercial non-energy service:  
Kazan (RU), Al-Wakrah (QA).

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## References:

1. European Energy Efficiency Platform (E3P), (2022, June 28), Energy Performance Contracting, [Energy Performance Contracting | E3P \(europa.eu\)](#)
2. Ericsson, (2022, June 28), Ericsson Mobility Reports, [Past and present reports - Mobility Report - Ericsson](#)
3. Burrows, Leah, (2021, February 1), *Deaths from fossil fuel emissions higher than previously thought*, [Deaths from fossil fuel emissions higher than previously thought \(harvard.edu\)](#)



# Improving sustainability and wellbeing while serving as Smart City backbone

**Case study:**  
Smart public lighting

**Industry:**  
Local authorities

## Executive summary

With the direct impact on energy savings, environmental sustainability and citizen wellbeing, modern public lighting serves at the same time as infrastructural backbone for other Smart City services, providing mechanical and electrical infrastructure to sensing, communication and engagement devices. Smart public lighting is cloud connected and open for vertical and horizontal integration with other Smart City applications. The system is fully prepared for asset management data integration.

## At-a-glance

### Goal:

- Energy savings;
- Light pollution decrease;
- Integration with Smart City management;
- Infrastructure for general Smart City peripheral equipment;

### Approach:

- Use state of the art lighting and communication technologies;
- Enable open, future proof and safe software platform;

### Results:

- Reduction of energy consumption;
- Reduction of waste;
- Reduction of light pollution;
- Flexible and vibrant light atmosphere;
- Quick and easy way to install Smart City applications;
- Open and integrated cloud platform;

### Featured solutions:

- Smart connected drivers;
- Bidirectional communication channels towards sensors, actuators and communication devices;
- Long lasting and green electronic components.

## The challenge:

City management has become more complex in recent decades. Integrated management of different systems is becoming more and more important.

City life has its daily rhythms and citizen have their own daily movement patterns inside the city. City infrastructure needs to adapt and follow these natural cycles providing a maximum of citizen well-being.

Cities compete globally for international positioning and branding. Unique visual image of the city is one of the key factors of its international recognition and reputation.

Modern Smart City systems require an increasing number of peripheral devices, sensors,

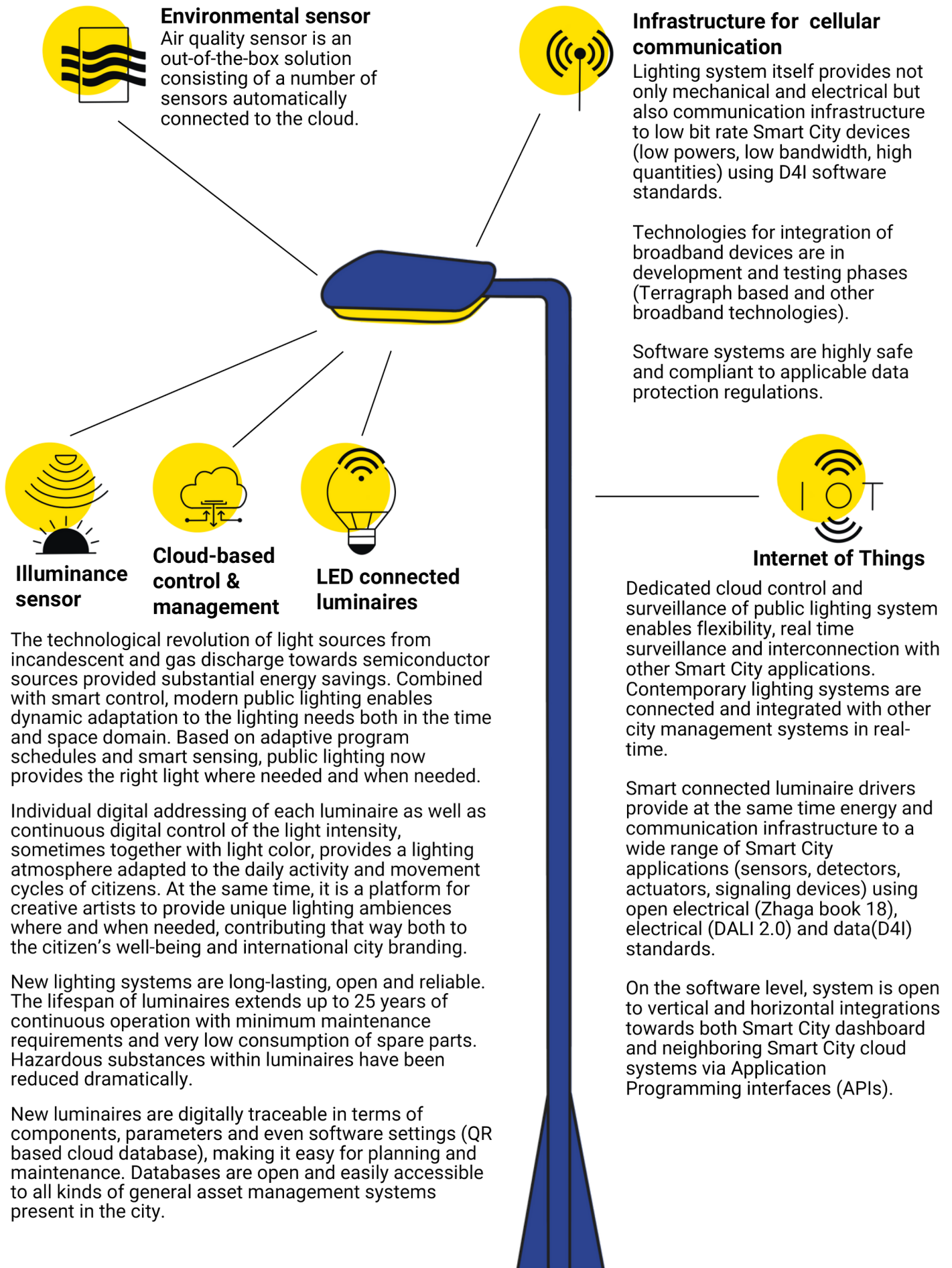
detectors, cameras, communication base stations, actuators, signal devices, loudspeakers and displays. All this equipment needs 24/7 mechanical, electrical and communication infrastructure.

Smart City systems need systematic data management to enable cost-effective planning, contracting and maintenance. Good city asset management provides substantial financial savings to the City.

All the above issues point to the need for Smart City infrastructure across the city that is:

- Energy efficient
- Long lasting
- Intelligent and flexible
- Connected
- Digitally traceable
- Open
- Future proof

## The solution:



# Wireless connectivity through public lighting system

**Case study:**  
Smart public lighting

**Industry:**  
Local authorities

## Executive summary

Signify and Edzcom deliver wireless connectivity through existing public lighting system infrastructure in the City of Tampere. The City planned to use new technology to advance their digital agenda to improve digital services by providing a highly connected environment. Objective was to become a zero-crime city and use Smart City solutions to accelerate this.

## The challenge:

In the wake of rapid urbanization and industrialization, cities around the world are facing exponential demand for resources such as public transport, housing, water supply and sanitation. These issues cannot be ignored, and Smart City projects aim to tackle them by focusing on how technology can be implemented to improve the lives of citizens and make cities more sustainable in a socially inclusive way.

Signify (Euronext: LIGHT), the world leader in lighting, and Edzcom, a European market leader in Edge Connectivity solutions, are bringing the City of Tampere one step closer to the future. The unique BrightSites solution delivers fast and reliable connectivity to every street corner using the city's own network integrated in public lighting system. It removes the need to lay fiber connections throughout the city, while needing only a fraction of the time and cost of traditional methods. This allows the City of Tampere to accelerate the deployment of present and future broadband IoT applications such as 5G, WiFi and Smart City services.

All complex Smart City systems need systematic data management to enable cost-effective planning, contracting, and maintenance of systems.

## At-a-glance

### Goal:

- Energy savings;
- Zero-crime city;
- Highly connected environment
- Integration with Smart City management;
- Infrastructure for general Smart City peripheral equipment;

### Approach:

- Use most advanced public lighting and communication technologies;
- Enable open, future proof and safe software platform;

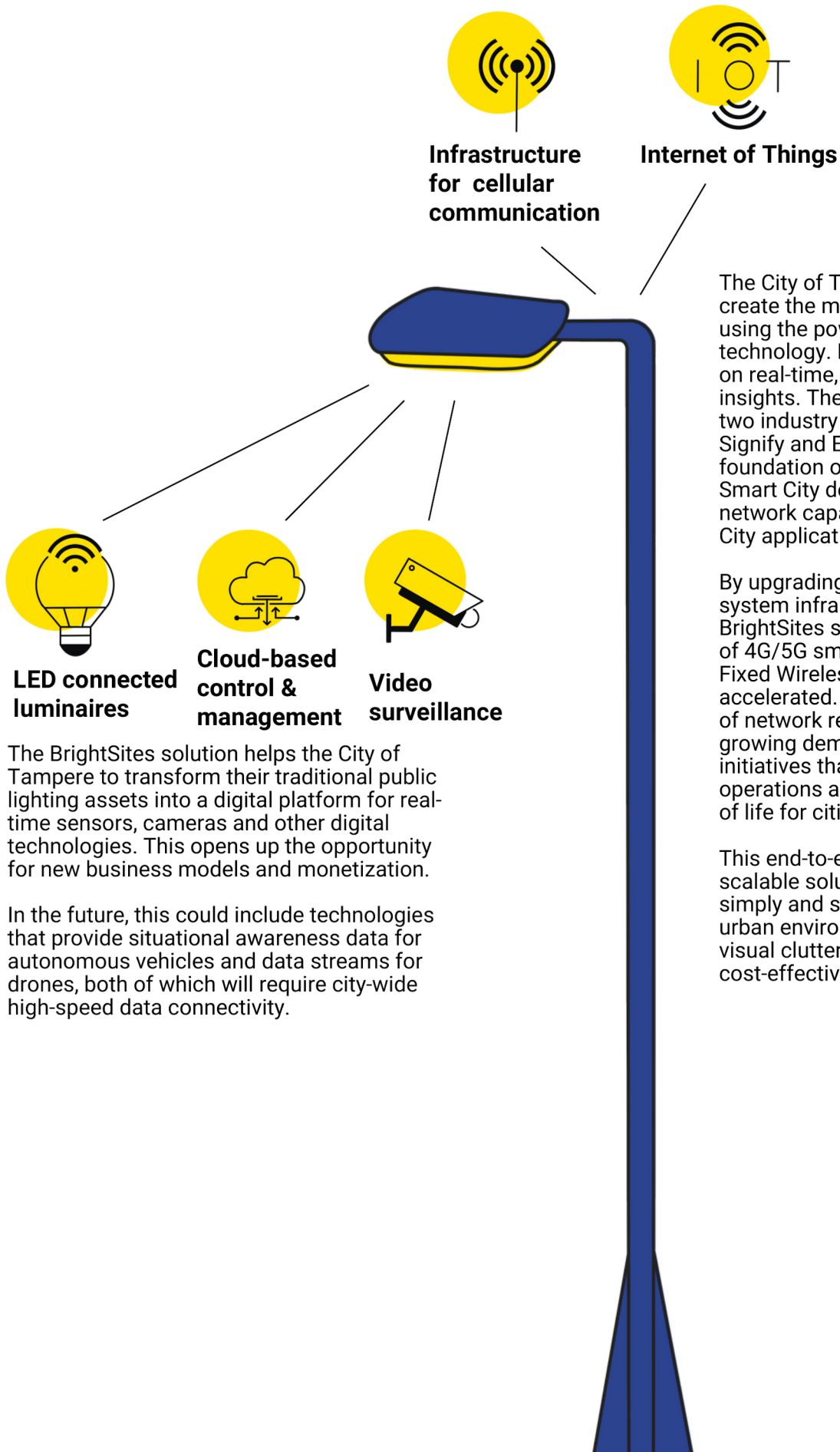
### Results:

- Reduction of energy consumption;
- Reduction of waste;
- Flexible and vibrant light atmosphere;
- Quick and easy way to install Smart City applications;
- Open and integrated cloud platform;

### Featured solutions:

- City of Tampere, Finland, installs BrightSites solution by Signify to provide super-fast wireless communication using high-quality LED luminaires;
- BrightSites leverages existing public lighting infrastructure to deliver city-wide connectivity at fraction of the usual cost. This is the first ever end-to-end solution to solve cities' challenges of connectivity.

## The solution:



The City of Tampere's ambition is to create the most sustainable society using the power of digitalization and technology. It's a society that lives on real-time, data-driven actionable insights. The City has partnered with two industry leading companies, Signify and Edzcom, to create the foundation of such a society for a Smart City deployment: a city-wide network capable of managing Smart City applications.

By upgrading the public lighting system infrastructure with the BrightSites solution, the deployment of 4G/5G small cells, Wi-Fi and Fixed Wireless Access is accelerated. It enables the increase of network reach and caters for the growing demand of IoT led initiatives that optimize City operations and improve the quality of life for citizens.

This end-to-end, wireless and scalable solution can be integrated simply and seamlessly into the urban environment without creating visual clutter in a sustainable and cost-effective way.

The BrightSites solution helps the City of Tampere to transform their traditional public lighting assets into a digital platform for real-time sensors, cameras and other digital technologies. This opens up the opportunity for new business models and monetization.

In the future, this could include technologies that provide situational awareness data for autonomous vehicles and data streams for drones, both of which will require city-wide high-speed data connectivity.





Sabinov, Slovakia

# Environmental monitoring sensors and EV chargers integrated in highly efficient LED public lighting system

**Case study:**  
Smart public lighting

**Industry:**  
Local authorities

## Executive summary

Sabinov is a small city in Slovakia with a Medieval city center, that was typically short on modern technology. The City wanted to start monitoring weather and air quality in the district. Historical data would help them understand if air quality was being improved by increasing the use of EVs and other energy efficiency measures and inform the public in case of poor air quality.

## At-a-glance

### Goal:

- Energy savings;
- Light pollution decrease;
- Integration with Smart City management;
- Infrastructure for general Smart City peripheral equipment;

### Approach:

- Use energy efficient lighting;
- Use air quality monitoring to measure impact of increased use of EVs;
- Use air quality monitoring to inform citizens on air quality;

### Results:

- Reduction of energy consumption;
- Reduction of waste;
- Reduction of light pollution;
- Quick and easy way to install Smart City applications;
- Open and integrated cloud platform;
- Increased use of EVs;
- Air quality improvement;

### Featured solutions:

- Weather transmitter WXT530 (Vaisala);
- Air quality transmitter AQT420 (Vaisala).

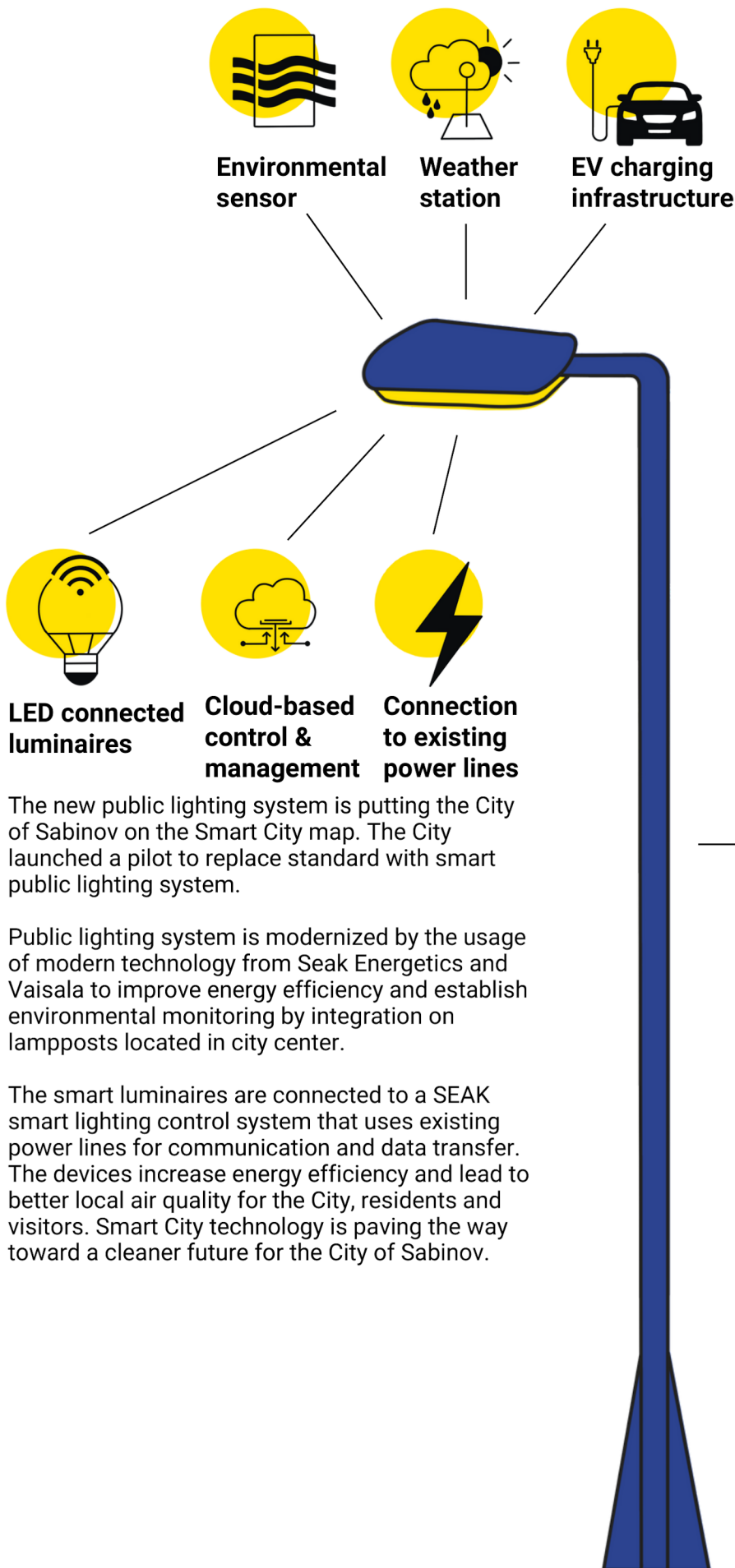
## The challenge:

The city of Sabinov was looking for innovative ways to integrate modern energy efficiency solutions in public lighting system. As residents and tourists started using more electric vehicles (EVs), the City decided to reconstruct existing public lighting system by using LED luminaires and EV charging stations integrated in lampposts in the city center.

SEAK Energetics specializes in creating smart lighting solutions. Their public lighting systems solutions are not only providing energy-efficient lighting; they integrate technology for better living. The solutions helps the City in measuring air quality, get real-time weather data and improve energy efficiency.



## The solution:



Each lamppost is integrated with a Vaisala Weather Transmitter WXT530, Vaisala Air Quality Transmitter AQT420 and LUMiCHARGER EV charger.

The all-in-one WXT530 provides the most important weather parameters: air pressure, air quality, air temperature, humidity, rainfall, and wind speed and direction.

The AQT420 provides accurate air quality data on gaseous pollutants (NO<sub>2</sub>, SO<sub>2</sub>, CO and ozone O<sub>3</sub>) and particles (PM<sub>2.5</sub> and PM<sub>10</sub>).

The combined sensors provide a complete picture of current environmental conditions. The sensors are also giving the City greater awareness of their local climate, which will help them determine future lamppost locations.

The new public lighting system is putting the City of Sabinov on the Smart City map. The City launched a pilot to replace standard with smart public lighting system.

Public lighting system is modernized by the usage of modern technology from Seak Energetics and Vaisala to improve energy efficiency and establish environmental monitoring by integration on lampposts located in city center.

The smart luminaires are connected to a SEAK smart lighting control system that uses existing power lines for communication and data transfer. The devices increase energy efficiency and lead to better local air quality for the City, residents and visitors. Smart City technology is paving the way toward a cleaner future for the City of Sabinov.



### Helpdesk / advertising

While the City of Sabinov collects and analyzes data about lighting efficiency and environmental conditions, the Vaisala sensors are helping lay the foundations for weather and air quality awareness.

An app is maintained that provides citizens and visitors with local weather and air quality information, plus having the access to lamppost integrated EV chargers availability at their fingertips.

Real-time air quality monitoring enables the City to alert locals when pollution levels are higher than normal in order to take steps to minimize exposure.



Greater London, United Kingdom

# Taking charge of safe and reliable EV charging infrastructure integrated in lampposts

**Case study:**  
Smart City  
EV charging

**Industry:**  
Local authorities

## Executive summary

With a key driver being the environmental benefits, electric vehicles (EV) are becoming pivotal parts of urban regeneration. Reducing emissions and improving the carbon footprint of both individuals and communities, EVs and their supporting infrastructure are now vital assets for cities throughout the world. Greater London area (including 32 London boroughs and the City of London) is taking charge of safe and reliable on-street EV infrastructure in 2019 in collaboration with Ubitricity and Lucy Zodion.

## At-a-glance

### Goal:

- Public lighting system infrastructure used for both illumination and infrastructure for EV charging;
- Safe and reliable public EV charging infrastructure;

### Approach:

- Provide a certified and approved solution that works alongside existing public lighting system infrastructure;
- Meet all relevant industry standards, as well as those outlining the safety of users;
- Demonstrate a proven track record;
- Immediately available solution;

### Results:

- Reduction of emissions and improving the carbon footprint;
- Electrical safety within the public lighting lamppost;
- Safety of the end-user while accessing EV charging;

### Featured solutions:

- Ubitricity's charging equipment;
- Lucy Zodion Trojan Midi with 32A switch disconnector including several thousand secondary isolators to provide 32A supply protection and lockable isolation for public lighting lamppost. They provide 25A residual protection for the 5.8kW EV charging equipment, plus 6A protection for the luminaires to continue operating as normal in the event of a fault on the charging equipment;
- Appropriate protection of both the EV charging equipment and user from electric shock in line with industry standards;
- Separate feed to the luminaire to ensure continual operation.

## The challenge:

The main challenge of the project was to support the transition of the use of the public lighting. From being solely used to illuminate public areas, it is now required to become a multipurpose piece of street furniture, providing both illumination and infrastructure for EV charging simultaneously, while ensuring power and protection to both people and equipment, in-line with electrical regulations.

Not only the electrical safety within the public lighting lamppost is considered, but also the safety of the end-user while using EV charging point. The solution had to provide a separate feed to the luminaire to ensure continual operation in the event of electrical issues.

There are a number of initiatives throughout the UK that are helping to drive the uptake of EV. One of these initiatives is the 'Go Ultra-Low City Scheme' (GULCS) procurement framework, which has been set up by London Councils, TfL and the GLA, to ensure the Capital's transport network meets its aim to be the Ultra-Low Emission Vehicles (ULEV) capital of Europe.

The Scheme has four main streams of work which focus on making residential charging available, increasing the provision of fast chargers and increasing the provision of charging infrastructure in car club bays. This increased uptake refers to solutions required not only to make EV charging points more accessible, but also to ensure the supporting infrastructure is capable of providing a consistent, safe and reliable power supply.

Ubitricity is a market leading supplier of on-street EV charging solutions, integrating them within existing street furniture to make public EV charging available and simple to use. This EV charging specialist recently carried out work as part of the GULCS by transforming existing public lighting lampposts into on-street charging points, throughout the City of London and surrounding boroughs.

As the UK's market leader in the provision of connection equipment for public lighting system infrastructure, including the sole supply of public lighting cut-outs and isolators into the UKPN electrical network, Ubitricity selected Lucy Zodion as its solution partner for this project.

## The solution:



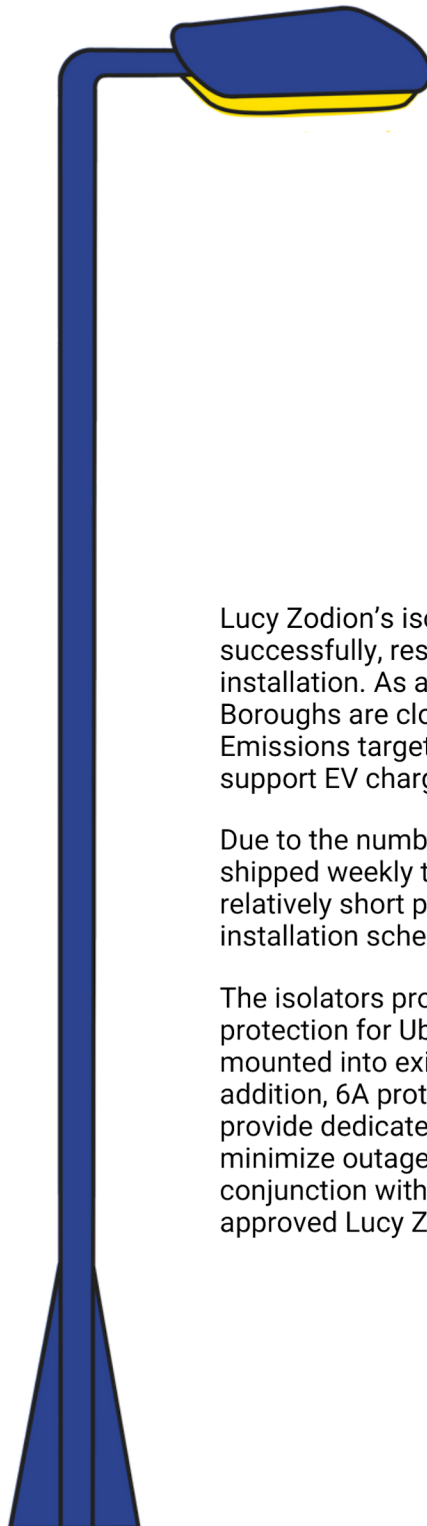
**LED connected luminaires**



**EV charging infrastructure**



**Connection to existing power lines**



Lucy Zodion's isolation solution met all objectives successfully, resulting in a certified and approved installation. As a result of the project, various London Boroughs are closer to meeting their Ultra-Low Emissions targets with a capable infrastructure to support EV charging points.

Due to the number of units required, these were shipped weekly to support a wide-scale roll out over a relatively short period, which suitably matched the installation schedule.

The isolators provide 25A residual current and overload protection for Ubitricity's 5.8kW EV chargers, which are mounted into existing public lighting columns. In addition, 6A protection is included for the luminaires to provide dedicated supply and protection in order to minimize outages. The isolators were used in conjunction with the Network Operators (UKPN) approved Lucy Zodion Street Lighting Cut-Out.





Los Angeles, California, USA

# Accelerating EV charging adoption inside the city's limits

**Case study:**  
Smart City  
EV charging

**Industry:**  
Local authorities

## Executive summary

The Los Angeles Bureau of Street Lighting (LABSL) partnered with FLO, to make the most of the City's complex public lighting infrastructure featuring over 220,000 individual lighting poles. EV charging infrastructure was integrated into the existing public lighting system infrastructure to leverage the excess power resulting from public lighting system reconstruction. The project resulted in 3,699 charging sessions with average session duration of 2 hours and 23 mins and average monthly growth in users of 24%. Total energy transferred is 40,879 kWh.

## At-a-glance

### Goal:

- Leverage Existing Infrastructure;
- Condense Deployment Timeline;
- Achieve large geographical exposure;
- Foster EV Adoption;

### Approach:

- Using excess power to integrate EV charging infrastructure into the existing public lighting system;
- Provide a certified and approved solution that works alongside existing public lighting system infrastructure;
- System durability;
- Quick deployment of EV charging infrastructure;

### Results:

- Reduction of emissions and improving the carbon footprint;
- Reduction of both installation and energy costs;

### Featured solutions:

- 324,000 EV drivers (964,000 by 2025);
- Station Models: SmartTWO.

## The challenge:

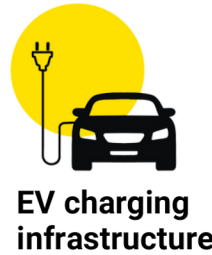
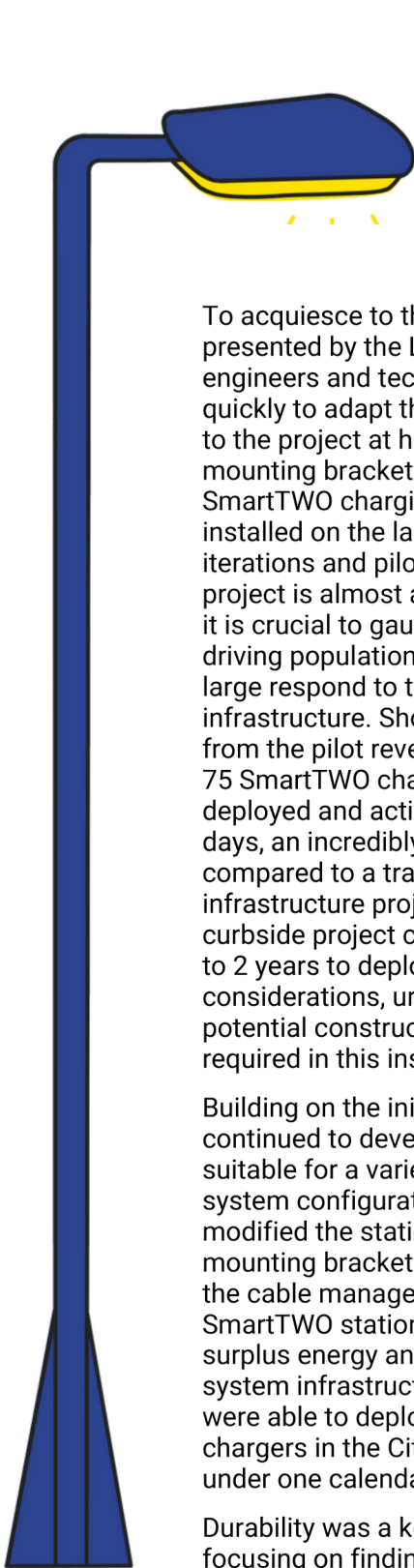
A recent public lighting system upgrade resulting with its transition to LED technology resulted in excess available power inside the public lighting system infrastructure. As part of their commitment to foster EV adoption inside the City's limits, the City of Los Angeles aspired to using this excess power to integrate EV charging infrastructure into the existing public lighting system and combat "range anxiety", the phenomena which sees EV drivers concerned about their vehicle's charge being insufficient for their commuting needs.

In detailing their vision for the project, LABSL articulated a specific set of goals and a

unique series of challenges. Early conversations with the utility revealed their intentions for the project to be threefold:

- First, to leverage the department's existing infrastructure (public lighting lampposts) for integration, thus reducing the overall costs and timeline for deployment;
- Second, to source robust and durable hardware capable of functioning in all the diverse neighborhoods of the City of Los Angeles;
- And finally, to deploy the charging stations in a way that would cover the largest geographical range while servicing the largest percentage of the EV driving community.

## The solution:



To acquiesce to the specific challenges presented by the LABSL, FLO's team of engineers and technicians had to move quickly to adapt their existing technology to the project at hand. FLO developed a mounting bracket which allowed the SmartTWO charging stations to be installed on the lampposts, after several iterations and pilot installations. A pilot project is almost always recommended, as it is crucial to gauge how both the EV driving population and the population at large respond to this new EV charging infrastructure. Shortly after the analytics from the pilot revealed it to be a success, 75 SmartTWO charging stations were deployed and active in approximately 90 days, an incredibly condensed timeline as compared to a traditional curbside infrastructure project. A traditional curbside project can take anywhere from 1 to 2 years to deploy, mostly due to design considerations, urban planning and potential construction that was not required in this instance.

Building on the initial success, FLO continued to develop mounting brackets suitable for a variety of public lighting system configurations and further modified the stations via an auxiliary mounting bracket designed specifically for the cable management system of the SmartTWO station. By leveraging the City's surplus energy and existing public lighting system infrastructure, FLO and the LABSL were able to deploy the initial run of EV chargers in the City of Los Angeles in under one calendar year.

Durability was a key procurement factor, focusing on finding charging stations that would remain operable through extreme heat or potential vandalism. FLO's SmartTWO stations, constructed from aluminum and NEMA 3R certified turned out to be ideal for this deployment.

The modular or "hot swap" element of the SmartTWO station allows a repair technician to replace broken or malfunctioning components quickly and easily in as little as ten minutes. This modular technology assists greatly in maintaining a high station "uptime," a priority for both EV drivers and EV charging points owners.

Los Angeles is a sprawling metropolis covering over 1,300 square kilometers (500 miles), and it was imperative to the City that the SmartTWO deployment service the greatest number of potential EV drivers. After careful consideration and planning, the SmartTWO chargers were deployed in a manner that covered approximately 89% of the city's square kilometers and stretched across all fifteen counties in the city. Data insights from the now operational EV charging network in Los Angeles illustrate that the average distance travelled between stations is a mere 7.11 kilometers (4.42 miles), demonstrating an effective capacity to combat range anxiety; furthermore, the average charging session from these stations added approximately 50.05 kilometers (31.1 miles) of range to the EV charge, more than satisfying the needs of a commuter in Los Angeles, who travel on-average 20.76 kilometers to get to work.





Kazan, Russia

# Piloting the lamppost integrated solution as a prerequisite for mass scale of 5G roll-out

**Case study:**  
Smart City Communication technologies

**Industry:**  
Communications service providers

## Executive summary

The Lightpole 6730 site in Kazan (Russia), 17 meter in height, was completely installed in less than 8 hours due to its pre-assembly. Such an approach showed the high market potential due to Telco's operating model to leverage customer and application demands for high bandwidth, low latency and seamless connectivity.

## The challenge:

As demand for broadband connectivity and high data speeds increases, communications service providers (CSP) are identifying creative ways to accelerate 5G rollouts while at the same time reducing the total cost of ownership. In urban environments in particular, delays in site acquisition cost and the general challenges of getting permits approved by local councils, as well as concerns regarding the aesthetic aspects of installations is adding up to a challenge.

With its low latency and high bandwidth, 5G will speed mobile video streaming, enhance online gaming experiences in virtual worlds and enhance sports and entertainment events.

A macro cell network alone can't provide the high-quality,

always-on experience that mobile broadband customers will expect of 5G. Small cell radio base stations are needed to complement the macro network, especially in dense urban areas. An outdoor small cell can cover a sizeable outdoor area, as well as indoor users on lower floors of buildings.

While small cells are a vital tool for network operators, placing them in the urban areas where they're most needed can be a laborious and expensive process. Site acquisition typically takes 9 to 22 months; deployment can take another 6 to 12 months. Meanwhile, the requirements for camouflage are continuously increasing and the local permitting process can be difficult.

To address these challenges, Ericsson, along with Smart City solution provider Ubicquia and with support from AT&T, have partnered to introduce Ericsson Street Radio 4402.

## At-a-glance

### Goal:

- Innovative micro-site coverage via new type of infrastructure (lamppost integrated);

### Approach:

- Fast and simple deployment
- Leverage existing smart lighting infrastructure;

### Results:

- 5G user experience;
- Increased broadband connection points;
- Low power consumption ;
- Minimal ground footprint;
- Power grid available on site;

### Featured solutions:

- Ericsson SW/HW equipment standardized according to 3GPP requirements;
- Lightpole 6730 is multi-technology product (2G,3G,4G/5G,IoT);
- ENM (Ericsson Network Manager) is used for data collection and management system across RAN nodes and other network parts;
- Ericsson remote site management gives all time visibility to the site equipment, remote site control and supervision, automated and simplified workflows and O&M control;
- Controller 6610 is the key component of the Ericsson RSM.



## The solution:



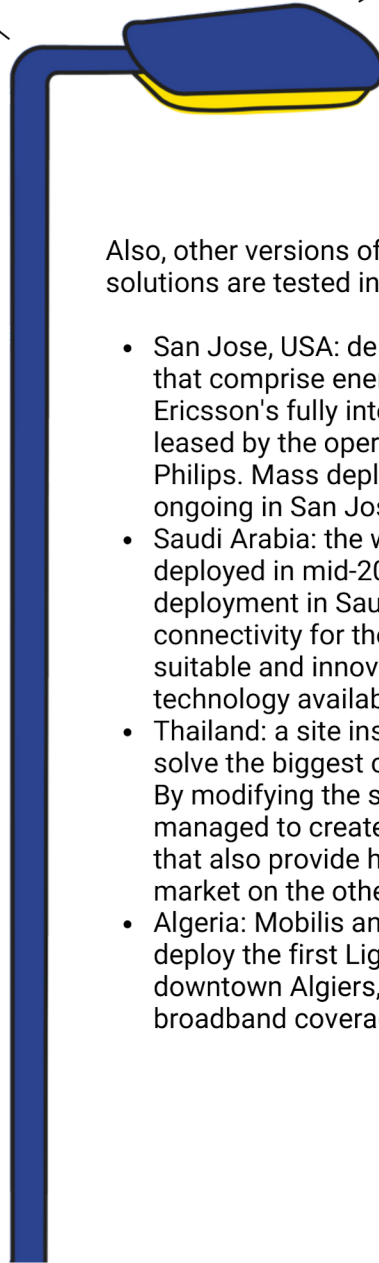
**Infrastructure  
for cellular  
communication**



**LED connected  
luminaires**



**Cloud-based  
control &  
management**



Innovative micro-site coverage introduces new type of infrastructure (lamppost integrated solution) where the service offering depends on Telco Operator business strategy. The featured benefits of the lamppost integrated solution are:

- Enables site permits in difficult areas;
- Overcomes site acquisition issues; tailored to city infrastructure;
- Deploys in one day and reduces OPEX;
- Generates energy savings of 50%-70% through efficient LED lighting;
- Strengthens mobile broadband coverage in cities and seamless communication in dense areas inside the city;
- Supports all technologies as well as micro, macro; WiFi/camera/environmental sensors, fiber, antenna and MINI-LINK;
- Houses equipment both inside and under the lamppost.

Also, other versions of lamppost integrated solutions are tested in many networks like:

- San Jose, USA: deployment of 50 lampposts that comprise energy efficient LED lighting and Ericsson's fully integrated LTE. All sites are leased by the operator in agreement with Philips. Mass deployment of 200 lampposts is ongoing in San José and Los Angeles;
- Saudi Arabia: the world's first Lightpole site deployed in mid-2014, as part of a mass deployment in Saudi Arabia, providing prime connectivity for the citizens by using the most suitable and innovative infrastructure technology available;
- Thailand: a site installed with the purpose to solve the biggest congestion in a tourist hub. By modifying the standard design, Ericsson managed to create three cells in 180 degrees that also provide high capacity for a floating market on the other side of the area;
- Algeria: Mobilis and Ericsson partnered to deploy the first Lightpole site launched in downtown Algiers, to strengthen mobile broadband coverage in the city's dense areas.



Al-Wakrah, Qatar

# Bringing fans to their feet with 5G services during Amir Cup Final

**Case study:**  
Smart City Communication technologies

**Industry:**  
Communication service providers

## Executive summary

Ooredoo announced a new era of 5G opportunities demonstrating transformative, connected and digital 5G experiences with Ericsson at the 2019 Amir Cup Final and grand opening of the Al Janoub stadium, designed by world renowned architect, the late Zaha Hadid and built to host the 2022 tournament.

## At-a-glance

### Goal:

- Deliver transformative network innovations to stay ahead of the curve and at the top of the local market;

### Approach:

- Fast and simple deployment;
- Leverage existing smart lighting infrastructure;

### Results:

- 5G user experience;
- Increased broadband connection points;
- Low power consumption for sustainability goals;

### Featured solutions:

- Elastic Cloud Radio Technology including micro Radio 2203 and 2205 solutions, along with the Baseband 6502;
- Antenna with High Order Massive-MIMO.

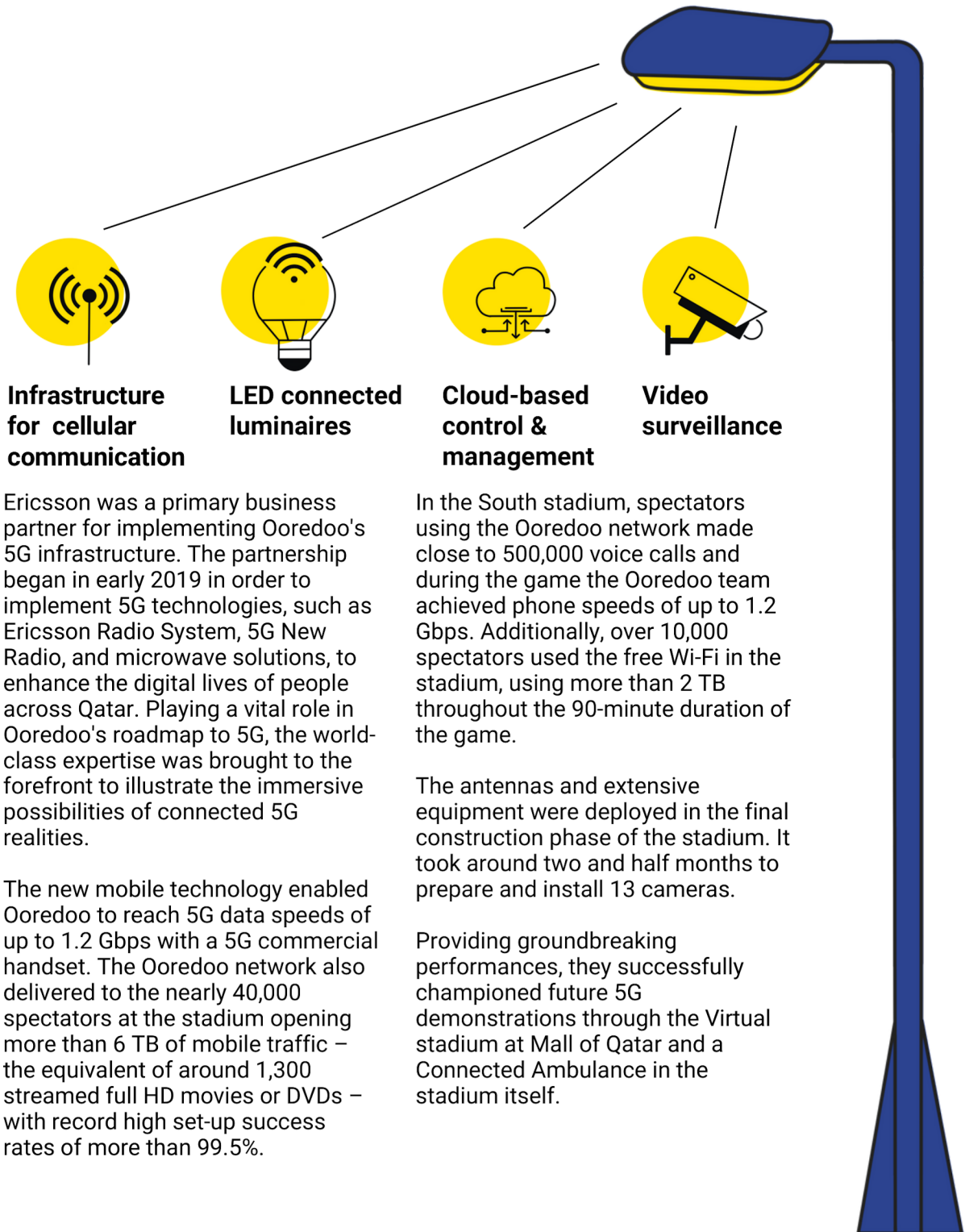
## The challenge:

Ooredoo(Qatari telecommunication company) was given an assignment to leverage 5G technology to deliver an unforgettable experience for fans attending the 2019 Amir Cup Final match.

As Qatar gears up to play host to the world's biggest sporting extravaganza, Ooredoo partnered with Ericsson to pilot innovative 5G solution during the Amir Football Cup final match. The solution needed to be integrated during the final phase of the stadium construction in a very limited timeframe.

Ericsson installed 5G technologies that built upon the current Ooredoo 4G network to reveal a new range of capabilities for customers and offered a projection of how their lifestyles will be improved with the next generation of connectivity.

## The solution:



Ericsson was a primary business partner for implementing Ooredoo's 5G infrastructure. The partnership began in early 2019 in order to implement 5G technologies, such as Ericsson Radio System, 5G New Radio, and microwave solutions, to enhance the digital lives of people across Qatar. Playing a vital role in Ooredoo's roadmap to 5G, the world-class expertise was brought to the forefront to illustrate the immersive possibilities of connected 5G realities.

The new mobile technology enabled Ooredoo to reach 5G data speeds of up to 1.2 Gbps with a 5G commercial handset. The Ooredoo network also delivered to the nearly 40,000 spectators at the stadium opening more than 6 TB of mobile traffic – the equivalent of around 1,300 streamed full HD movies or DVDs – with record high set-up success rates of more than 99.5%.

In the South stadium, spectators using the Ooredoo network made close to 500,000 voice calls and during the game the Ooredoo team achieved phone speeds of up to 1.2 Gbps. Additionally, over 10,000 spectators used the free Wi-Fi in the stadium, using more than 2 TB throughout the 90-minute duration of the game.

The antennas and extensive equipment were deployed in the final construction phase of the stadium. It took around two and half months to prepare and install 13 cameras.

Providing groundbreaking performances, they successfully championed future 5G demonstrations through the Virtual stadium at Mall of Qatar and a Connected Ambulance in the stadium itself.

