

## CUSTOMER SUCCESS STORY

Pioneering smart lighting in Croatia with Elumia smart lighting monitoring solution



# Our smart response

Discover how Elumia's smart lighting monitoring solution has enhanced the urban infrastructure in two Croatian cities, Ludbreg and Križevci, by digitizing and modernizing their public lighting infrastructure, improving operational efficiency, and reducing costs.

## Customer challenges

### Inefficiency of traditional lighting management systems

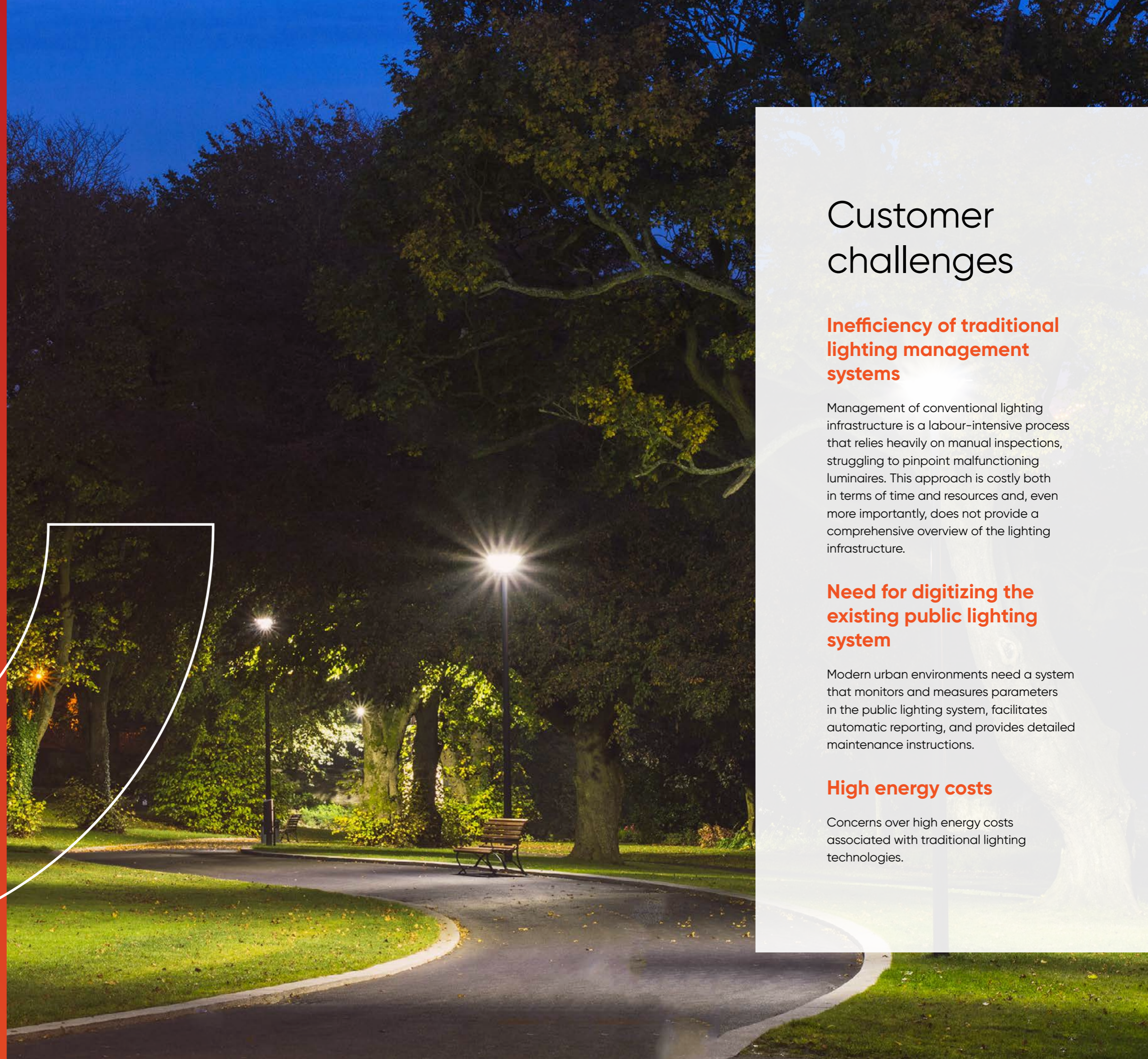
Management of conventional lighting infrastructure is a labour-intensive process that relies heavily on manual inspections, struggling to pinpoint malfunctioning luminaires. This approach is costly both in terms of time and resources and, even more importantly, does not provide a comprehensive overview of the lighting infrastructure.

### Need for digitizing the existing public lighting system

Modern urban environments need a system that monitors and measures parameters in the public lighting system, facilitates automatic reporting, and provides detailed maintenance instructions.

### High energy costs

Concerns over high energy costs associated with traditional lighting technologies.



# Iskraemeco solution

The pilot project spans two cities in Croatia, each with its unique project requirements, with the Elumia smart lighting monitoring system at the core of the solution.

This solution is designed to establish efficient lighting infrastructure and comprises three essential components:

1.

- **LED luminaires with delayed-ON switching: Providing flexibility with a choice of standard luminaires from various vendors. For luminaires without the delayed-ON function, CLSM sequencers have been added.**



2.

- **Elumia digital network analyzers and lighting controllers: Built on IE.5 meters and enhanced with EDGE compute capabilities.**



3.

- **Symbiot Elumia cloud-based software: Serving as a central access point for all ELUMIA lighting controllers.**



# Project scope

## Ludbreg

- Digitization of the existing public lighting system with 1,400 lamps and 50 public lighting distribution cabinets.
- Installation of built-in devices for sequential ignition of lamps (CLSM sequencers) and installation of Elumia lighting controllers with communication (GSM) modules.

## Križevci

- Dismantling of the existing 1,860 lamps and installation of 3,600 new energy-efficient LED lamps.
- Installation of 64 new public lighting distribution cabinets.
- Installation of LED lamps with programmable drivers to delay the ignition moment and installation of Elumia lighting controllers with communication (GSM) modules.
- Implementation of a system for monitoring and measuring the parameters of the public lighting system, facilitating automatic reporting and maintenance instructions.

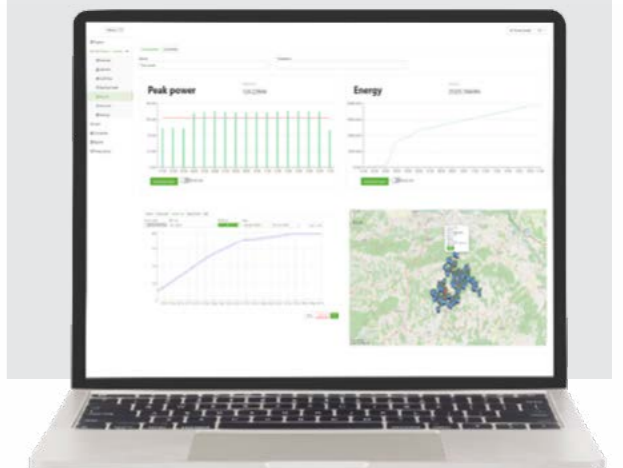
In total, the Croatian pilot project employs 137 Elumia lighting controllers with EDGE computing capabilities and 5,000 standard LED lights.



**SYMBIOT**  
Elumia

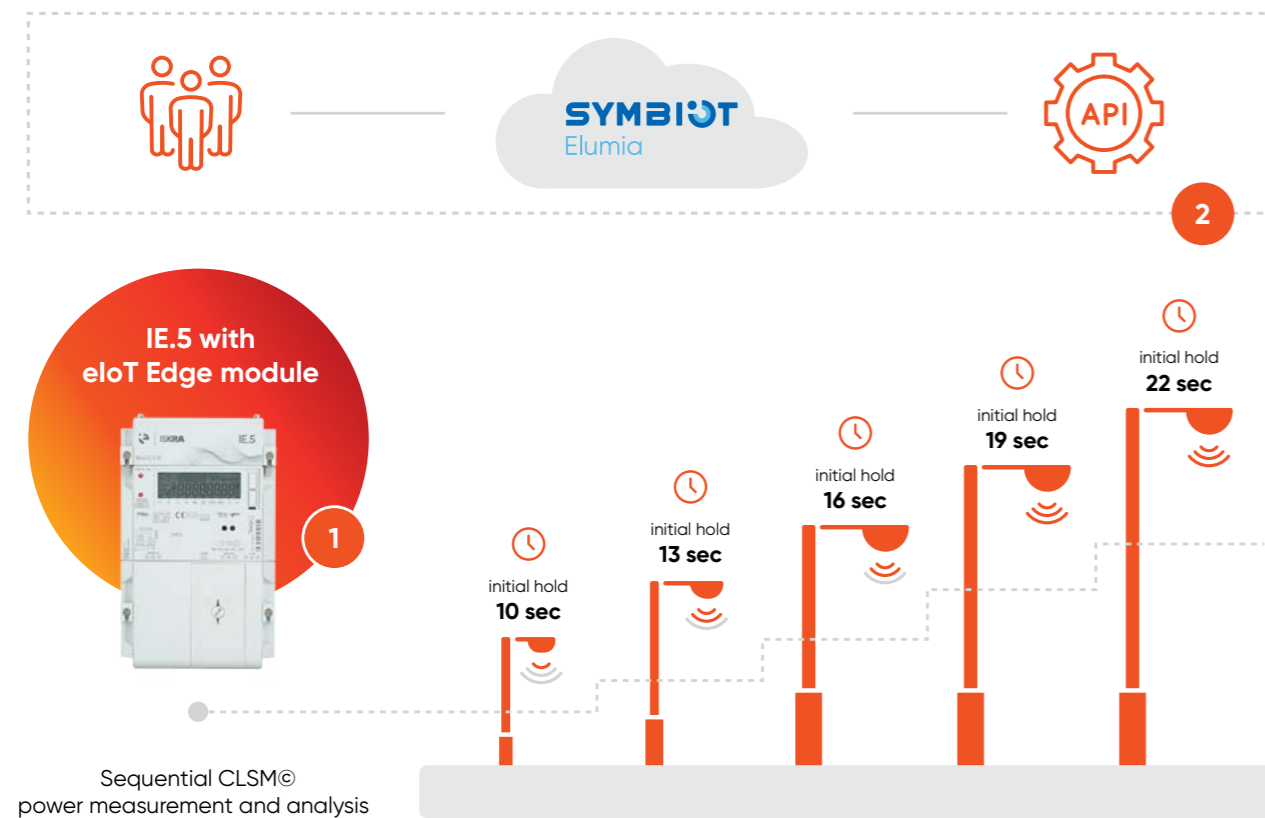
Symbiot Elumia software consolidates all essential data into a single platform, offering customizable reports that specify the condition and technical characteristics of each luminaire, including their type, height, location, and programming scenarios with scheduled power drops. The system monitors and measures the parameters of the public lighting system, creating automatic reports.

Maintenance teams benefit from reliable updates on the performance of the lighting system and individual luminaires. The system automatically generates job orders to facilitate swift and precise interventions.



# How the solution operates

The CLSM algorithm operates by sequentially activating luminaires and monitoring their power consumption. When a luminaire is in good condition, its power consumption increases upon activation, while a faulty luminaire's power remains unchanged. By observing the power profiles over time, the system can accurately identify malfunctioning luminaires.



Within Figure 1 and Figure 2, we present power profiles illustrating two scenarios: one featuring perfectly functioning luminaires and the other highlighting a scenario with a single malfunctioning luminaire.

Notably, in the latter case, there is an absence of a power step at position M3. Our advanced algorithm swiftly detects this anomaly and accurately identifies luminaire 3 as the culprit. For optimal operation, all luminaires are initially powered at reduced levels (10-50% of maximum power) and are sequentially powered to 100%. This approach ensures immediate illumination of the street while allowing the CLSM algorithm to identify issues through sequential power increases.

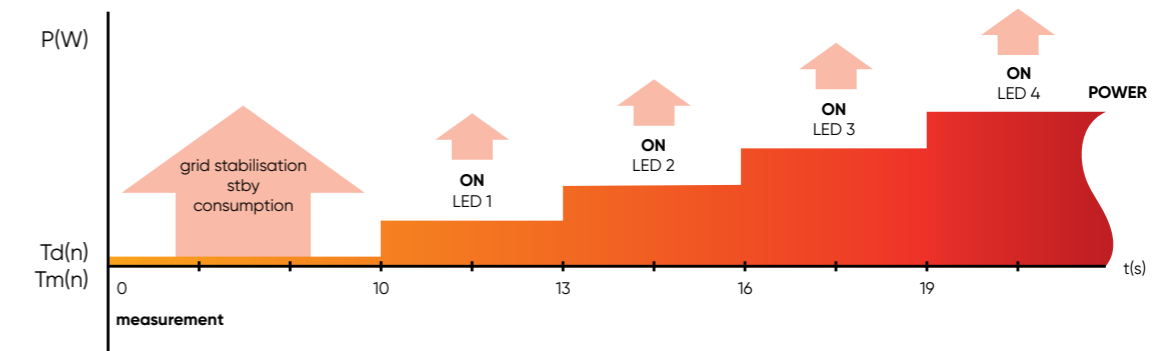


Figure 1. Power profile when all luminaires are functioning correctly.

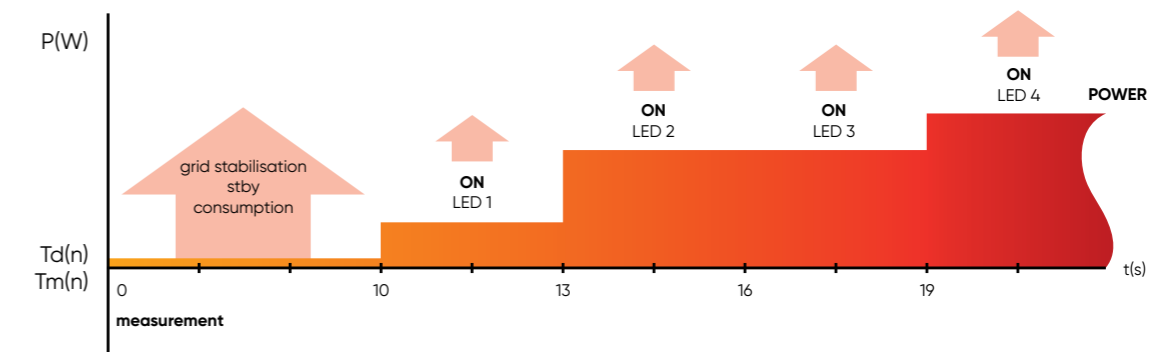


Figure 2. Power profile when luminaire No. 3 is broken.

# Core features

## Operation monitoring

- Monitoring the status of each lamp separately.

## Energy supervision

- Monitoring the energy consumption of each lamp separately.
- Consumption control by cabinet.

## Lighting control

- Controlling the status of each lamp when switched on.
- Controlling the consumption of each lamp during ignition.
- Controlling the consumption of the entire system or any of its parts.
- Controlling the lighting cabinet, position display on the GIS system.

## Smart power-on/off cycle control

- Smart cycle management of the power on/off cycle using the Elumia calendar.
- Real-time monitoring for the complete system in use.



# Results achieved

## Improved operational efficiency

- Transparency, one-point access, visibility, and instant communication (alarms, reports, job orders for maintenance teams) to improve the quality of operations.
- GIS map of the public lighting system.
- Supervision of each lamp and LDC's functionality.
- Measurement of consumption for each element and the entire system.
- User reporting on system status.

## Reducing monitoring and maintenance costs

- Reduction in ongoing maintenance costs.
- Fewer manual site inspections.
- Real-time detection of malfunctioning luminaires.
- Real-time power on/off based on a scheduled cycle and targeted intervention.

## Lower investment costs

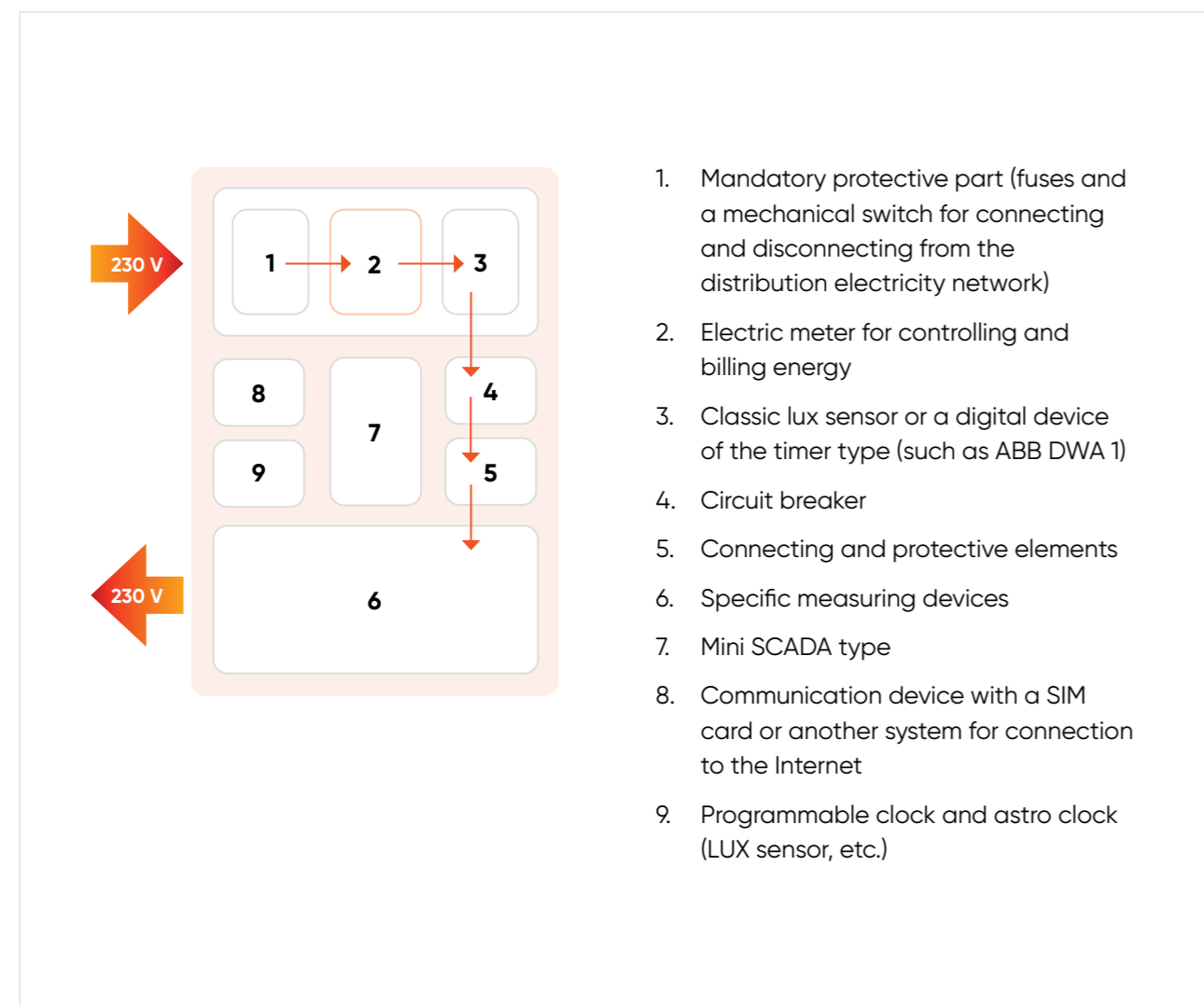
- Elimination of the need for additional electronics, devices, and costly communication infrastructure. Only an Elumia lighting controllers and standard LED lights with delayed ON switching are required.
- Significant reduction in cabinet and total installation costs.

# Theft Detection

Theft detection is an important benefit resulting from the implementation of the Elumia solution. Using our system, the customer has detected abnormally high energy consumption, surpassing the set values. Upon conducting a thorough investigation, it was revealed that the owner of a truck parking facility had illicitly connected to the municipal lighting system, utilizing public lighting on his private property.

# Reduced TCO

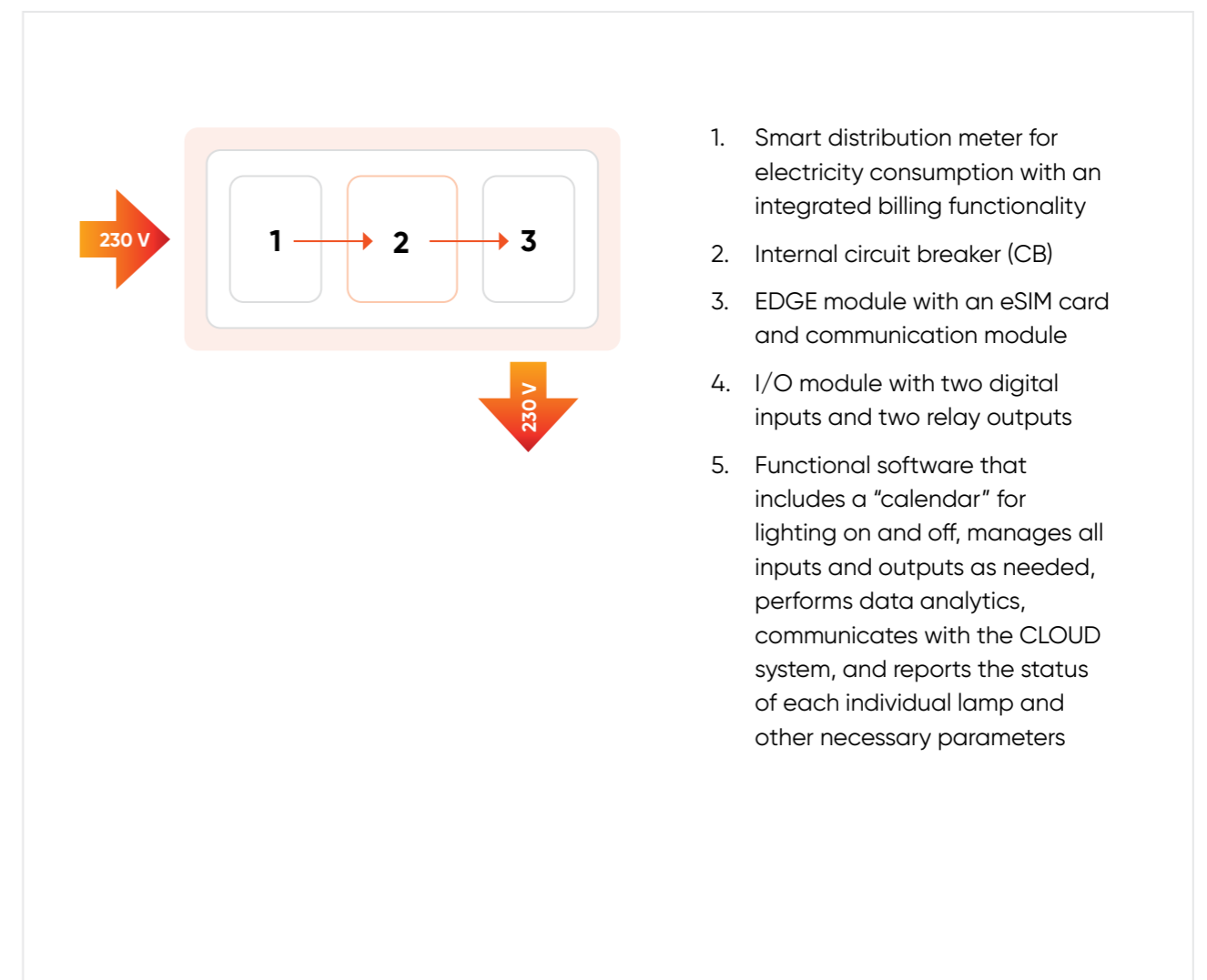
**Significant reduction in lighting control cabinet components, total installation costs and total cost of ownership.**



**By purchasing an Elumia lighting controllers, you can enjoy the following cost reductions and benefits:**

- Reduction in components of public lighting cabinets
- Decreased risk of failure due to the streamlined components
- Time and expertise required for device installation in PLC are minimized

The lighting fixtures remain IoT-ready (if they adhere to ZHAGA BOK 18 and D4i PSU standards). This allows seamless integration of information from the Elumia system and facilitates upgrades provided by other existing systems.



# Elumia's Cost-Effectiveness

Elumia's standout feature in this project is its low investment barrier. ELUMIA offers a Total Cost of Ownership (TCO) that is lower than that of any existing solutions on the market.

Unlike its competitors relying on expensive hardware and sensors to connect to luminaires, Elumia utilizes power consumption profiles for monitoring the lighting system's health. This eliminates the need for additional equipment while also reducing costs and the risk of hardware malfunctions.



The foundation of the project is grounded in a comprehensive cost-benefit analysis (CBA) conducted at its inception. This analysis involved a comparative evaluation of various technological solutions to determine the most favorable balance between cost and quality.

Following the investment, a thorough cost analysis was conducted, including aspects such as annual hosting and data transfer expenses. Elumia has generated annual savings of 16,000 EUR, making it a highly cost-effective choice for your lighting management needs.

Digitalization of the current lighting system, using Elumia solution

The lowest investment.

Digitalization of the current system using CLSM extended module and IoT modules for individual lamp control

At least 26% more expensive.

Digitalization of the current system using IoT modules utilizing LoRaWAN and NB-IoT communication technologies for individual lamp control

At least 156% more expensive.

Digitalization of the current lighting system, using Elumia solution

16,000 EUR

Digitalization of the current system using CLSM extended module and IoT modules for individual lamp control

7,000 EUR

Digitalization of the current system using IoT modules utilizing LoRaWAN and NB-IoT communication technologies for individual lamp control

-86,000 EUR



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