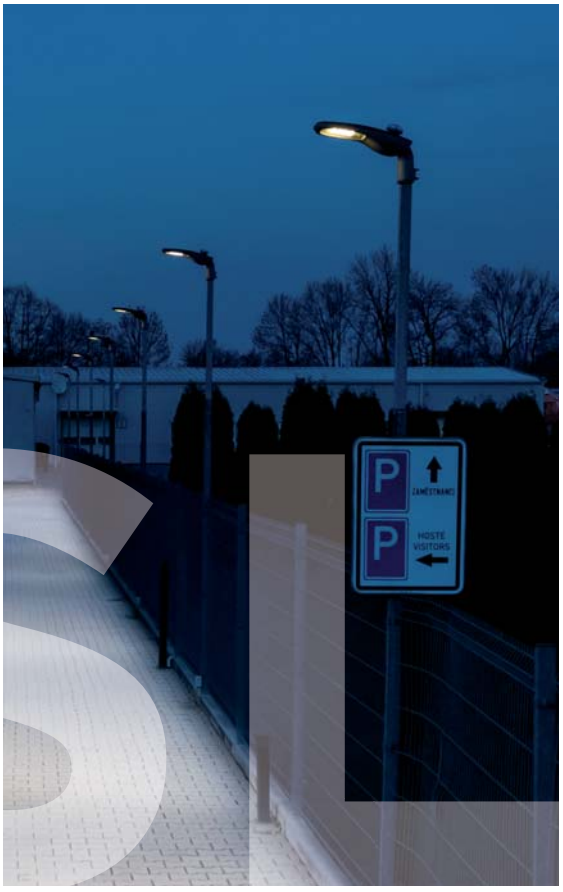

Smart Street Lighting

Economical and effective outdoor lighting solutions

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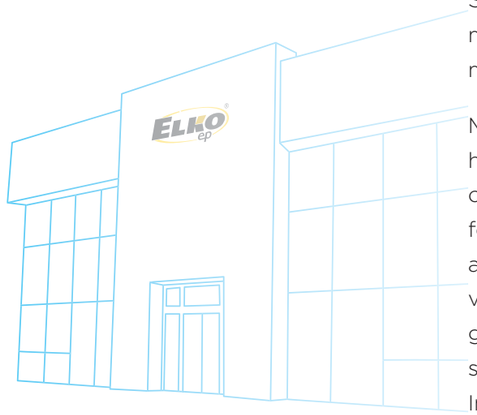
ELKO EP Holding

We are traditional, innovative and purely Czech development manufacturer of electronic devices and we have been your partner in the field of electroinstallations for 25 years.

ELKO EP employs about 330 people, exports its products to more than seventy countries, and has representatives in seventeen foreign branches. Company of the Year of the Zlín Region, Visionary of the Year, Global Exporter of the Year, Participation in the Czech TOP 100, these are just some of the awards received. Still, we are not finnished. We are constantly striving to move forward in the field of innovation and development. That‘s our primary concern.



Millions of relays, thousands of satisfied customers, hundreds of our own employees, twenty five years of research, development and production, seventeen foreign branches, one company. ELKO EP, innovative a purely Czech company based in Holešov, where development, production, logistics, service and support go hand in hand. Our primary focus is on custom-built systems for hospitality, health care, smart cities and the Internet of Things.

Public lighting

Public lighting is an essential component of the services for residents in any city or village. It helps facilitate people‘s movement and orientation and contributes to greater security. But what if the lamps in the streets could work a little differently? What if they could be much smarter?

Smart lighting by our design are not just meant to shine. He can think through the light. It can regulate the intensity of light based on the time of day, the ambient light and traffic density. In the event of a fault, it can transmit information required for repairs. Masts can serve as a conduit for additional sensors, detectors, weather stations, Wi-Fi signal transmitters, or security keys.

Retrofit options

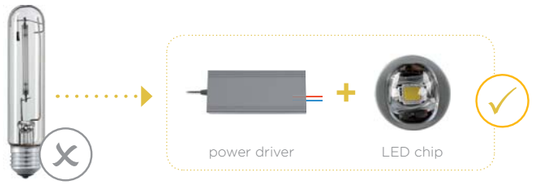
How can we deal with the renewal of public lighting? Let's describe the basic options and how much it will cost us. It is necessary to say that in the case of renewal of public lighting it is an investment for several decades. As in normal cases, the cheapest solution at the beginning is not usually so in the long-term.

1 „Corn“

- Replacement of old light sources (high pressure sodium) after LED lights called „Corn“.
- Price of revitalization of one light point: **50 EUR***.

This solution is very simple and inexpensive but has one major drawback. Troublesome cooling reduces significantly the life and luminous efficacy of the LED light.

2 LED light source retrofit



- Replacement of a part of the luminaire with new ones (e.g. high pressure sodium lamps).
- The revitalization price of one light spot: **150 EUR***.

Again a relatively easy solution. The question remains, however, whether there is a suitable and especially high-quality retrofit for you. Here, too, we encounter troublesome cooling problems.

3 Replacement lighting fixture

- Replace old lights fixtures with new ones.
- The price of revitalization of one light spot:
  - high quality LED - **200 EUR***.

Complete replacement of the luminaires brings higher costs, but it will certainly pay off, ideally combining the replacement of luminaires with the installation of smart drivers.

4 Smart Street Lamp

- Complete replacement of public lighting including masts, wiring and lights.
- Price of revitalization of one light spot: **250 EUR***.

We recommend this option for installations older than 30 years. With new luminaires it is always wise to add smart control. We supply our modules directly in the luminaires or as an external device.

* The prices above not include: installation, column and accessories.

SSL controllers

In order for the lights to be truly „smart“, it is necessary to equip them with a communication device (transmitter) and a corresponding power source (LED driver). For communication, we use wireless LoPAN networks, especially **LoRA** or **NB-IoT**, which provide **two-way** communication - so that the lights can be controlled and information retrieved from them. Consequently, one condition is the availability of a given network with sufficient signal at the point where the light sources are located. Signal quality can be measured with a special level gauge. We have several options of transmitters available.

Retrofit modul

Outdoor design for retrofi ts, placement externally on the body of the light, mast or base.

Retrofit

AirSLC-100L
AirSLC-100Nb

- **Outputs:** 0(1) - 10V DC / 10 mA
- **Connection:** wire outlets
- **Power supply:** 110 - 230 V AC
- **Dimensions:**
  - 182 x 62 x 34 with antenna
  - 96 x 62 x 34 without antenna
- **Communication:** LoRa/NBIoT
- **Antenna:** included

PLUG-IN (socket)

Receiver actuator in a special box with a bayonet connector for easy installation into lights equipped with this socket.

Plug

AirSLC-100/LUMAWISE

Power supply: 12-24 V DC
Output: 0 (1)-10 V (20 mA)
Communication: LoRa/NBIoT
Dimensions: 80 x 34 mm

AirSLC-100L/NEMA

Power supply: AC 100-230 V AC
Output: 0 (1)-10 V (20 mA)
Communication: LoRa/NBIoT
Dimensions: 84 x 98 mm

OEM (built-in) - Embedded

PCB board for direct integration into the power supply board.

Embedded

LoRaWAN Modul OEM (OEM)

- **Connection:** soldering pins
- **Power supply:** 5-24VDC, after breaking source parts only stabilized 3V3 / 140mAh
- **Dimensions:**
  - 19.5 x 46.1 (33.8)* x 4 mm with ULF connector
  - 119.5 x 57 (44.7)*x 7 mm with SMA connector
  - 19.5 x 46.1 (33,8)* x 21 mm with internal antenna

  * dimension after breaking the source section
- **Gain:** + 2,12 dB
- **Communication:** LoRA 868Mhz
- **Antenna:** external ULF or SMA connector, internal bent parts of the product

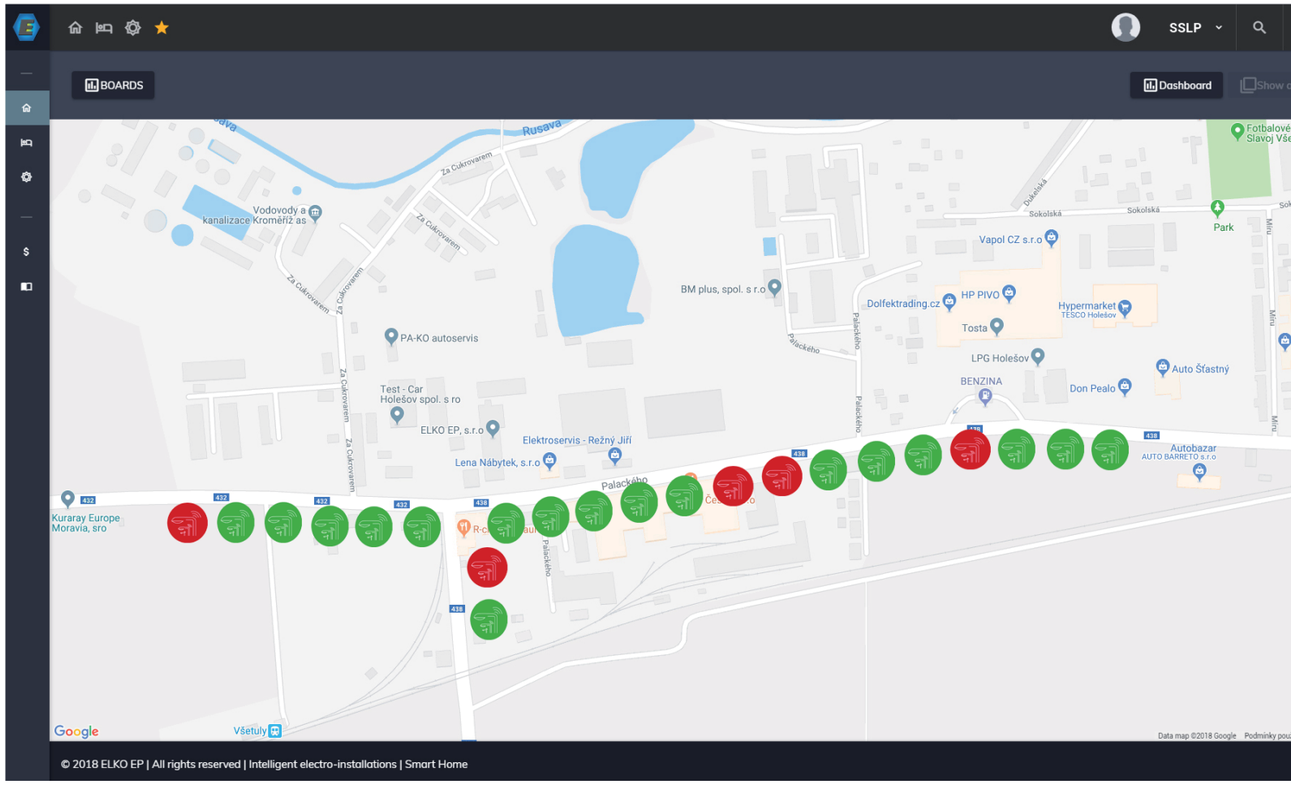
Smart street lighting platform

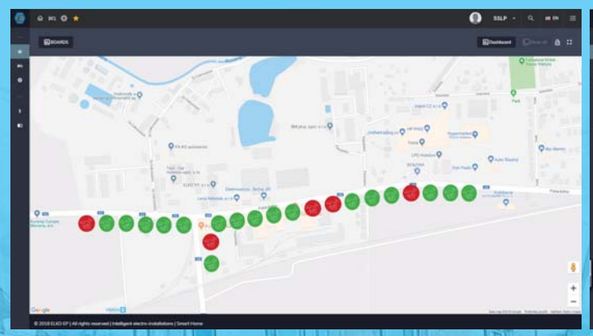
SSLP

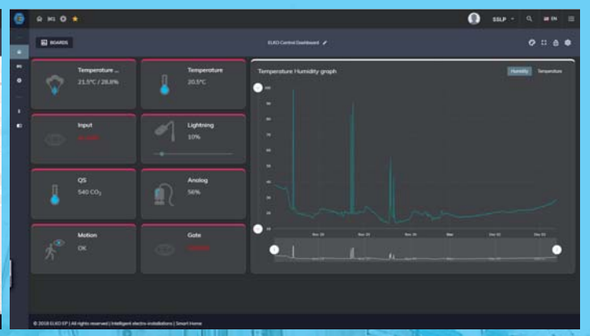
All smart street lights are connected to Smart city platform wirelessly. It gives you an easy way how to control and monitor all the lights in the city.

- ADVANCED DIMMING
  smart scheduled dimming
- COST REDUCTIONS
  with workflow management
- REAL-TIME CONTROL
  with user-friendly platform on your computer or laptop
- READY FOR IOT
  saving the data on the platform and it is connectively ready
- PREDEFINED SETTINGS
  for easy lighting and energy savings
- SECURITY
  with proper and safe authorization
- EFFECTIVE REPORTING TOOLS
  graphs, data and saving analysis
- SYSTEM, WHICH IS FLEXIBLE
  integration
- WIRELESS SOLUTION
  easy to upgrade whenever you want
- GPS DETECTION
  faster way how to find a defect on the lights
- UPDATES
  always “over the air”

We believe that each Smart city should have only one control platform. It allows not only the collection and evaluation of data, but also the control of all the elements of the smart city. That’s why with our smart lighting, you’ll also get a light control module.







System cooperation:

- changes in intensity occurrences
- plan switching events occurrences
- adding / changing / removing the lamp occurrences
- emergency situations
- 3rd parties commands

Reporting:

- consumption reporting
- operation reporting (failure status,
- components malfunction)
- disorder reporting
- service state reporting

Function:

- displayed on the map according to the light
- map view by technology
- monitoring according to operating status
- assignment to groups
- individual and group control
- smart scenarios
- graphs and statistics according to lighting, consumption, lifetime

Network comparation

items	LoRa	NB-IoT	GPRS	ZIGBEE
	LoRa™	NB-IoT Narrow band IoT		ZigBee
Frequency band	470/868/915 MHz	800/900/ 1800 MHz	850/900/ 1800 MHz	470M/868M/ 915M/2.4 G Hz
Communica-tion distance	10-15 km ideally 1-5 km urban rare	15 km	Unlimited	Node to Node: 150M
Communica-tion speed	0,2 37,5 Kbps	65 Kbps	115K bps	250 Kbps
Advantage	Good security Good anti-interfe-rence, low power consumption, low mainteance Wlan, multi-connections, free frequency	good security, good anti-interfe-rence, low power consumption, low mainteance, Wlan	Good security, good anti-interfe-rence, short time of accessing, low power consumpti-on, low maintean-ce, high speed of comm	Auto-mesh, high common speed
Disadvantage	Low speed of co-mmunicaton, max connection 500-1000 node, long distance	High price, NB-IoT network, public frequency	Data loss	Interferred by other radio, max. connetions only 255 nodes, comm distance short

Comparsion	250W High pressure Sodium	110W LED Street light
Qty	10 000	10 000
Hour/day	12	12
Day/Year	365	365

Principle of function

The main component of the infrastructure is the LoRA/NB-IoT LPWAN network that provides connectivity for IoT devices in Smart City.

BTS (Base Transceiver Station) receives commands from the backend server and sends them wirelessly to the individual light actuators. They process and execute the command (ON/OFF or the desired brightness setting).

The actuators are also equipped with sensors that detect the ambient parameters or input activation and send this information via the BTS back to the server, which evaluates, displays and can trigger the appropri-ate action.

Smart pole

In every big city we can find thousands today, sometimes even tens of thousands of public lighting poles. We can use this dense network to install sensors or security cameras, and thus increase security for the population. We gain information about the number of people or vehicles, we can evaluate the air quality or the noise level, inform the inhabitants about the status of transport and parking places. Poles can also be used for Wi-Fi signals or recharging stations. So we have absolutely unlimited possibilities to work with smart lighting, and it's up to the investor to improve the quality of life in the city.

Wi-Fi Hotspot

Connecting to the Internet becomes a public and an easily accessible property. Any Wi-Fi signal from our transmitter will flow through every smart pole.

Speaker

Warnings, reports. With this built-in speaker you will never miss any important information.

Air quality sensor

Smart sensors are the basic means for collecting and evaluating information. This will greatly contribute to improving air quality in cities.

Wireless charging

Let you charge your mobile phone while you are waiting for a bus. The wireless charger will take care of everything.

SOS button

Are you in real trouble and need help? One push of this button will tell the rescue services that something is wrong.

Communication hotspot

This device receives signals from sensors that control public lighting. Increases efficiency and cost savings.

Status signalling

The smart pole determines when it needs to be repaired. One of three colors indicates the status of the device.

Camera

The basis of security in each city is a system of security cameras that monitor the streets.

Socket 230V

The classic socket, as we know it, for moments when you just need a good dose of electricity.

Touch panel

Touch panel to find the information you need. It includes, for example, a clear map of the city.

USB charger

There is also a universal USB charger to connect to any device or appliance.

Socket 22 kW

The 22kW charging station is also suitable for outdoor environments. It charges up to 10 times faster.

Ultrasonic PIR

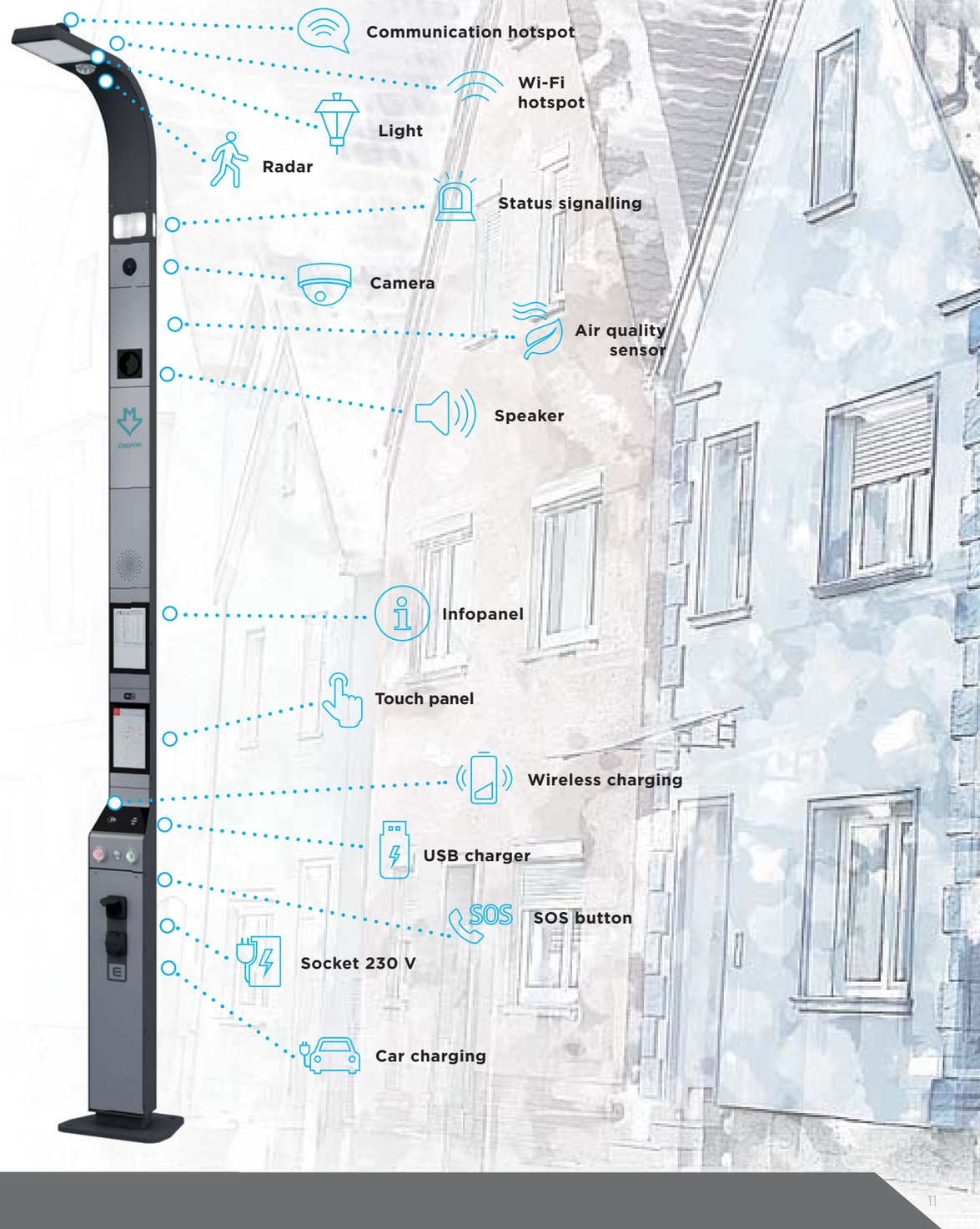
The sensor built into the body of the pole serves to detect the movement of people around you. This switches on the light only if it is really needed.

Car charging

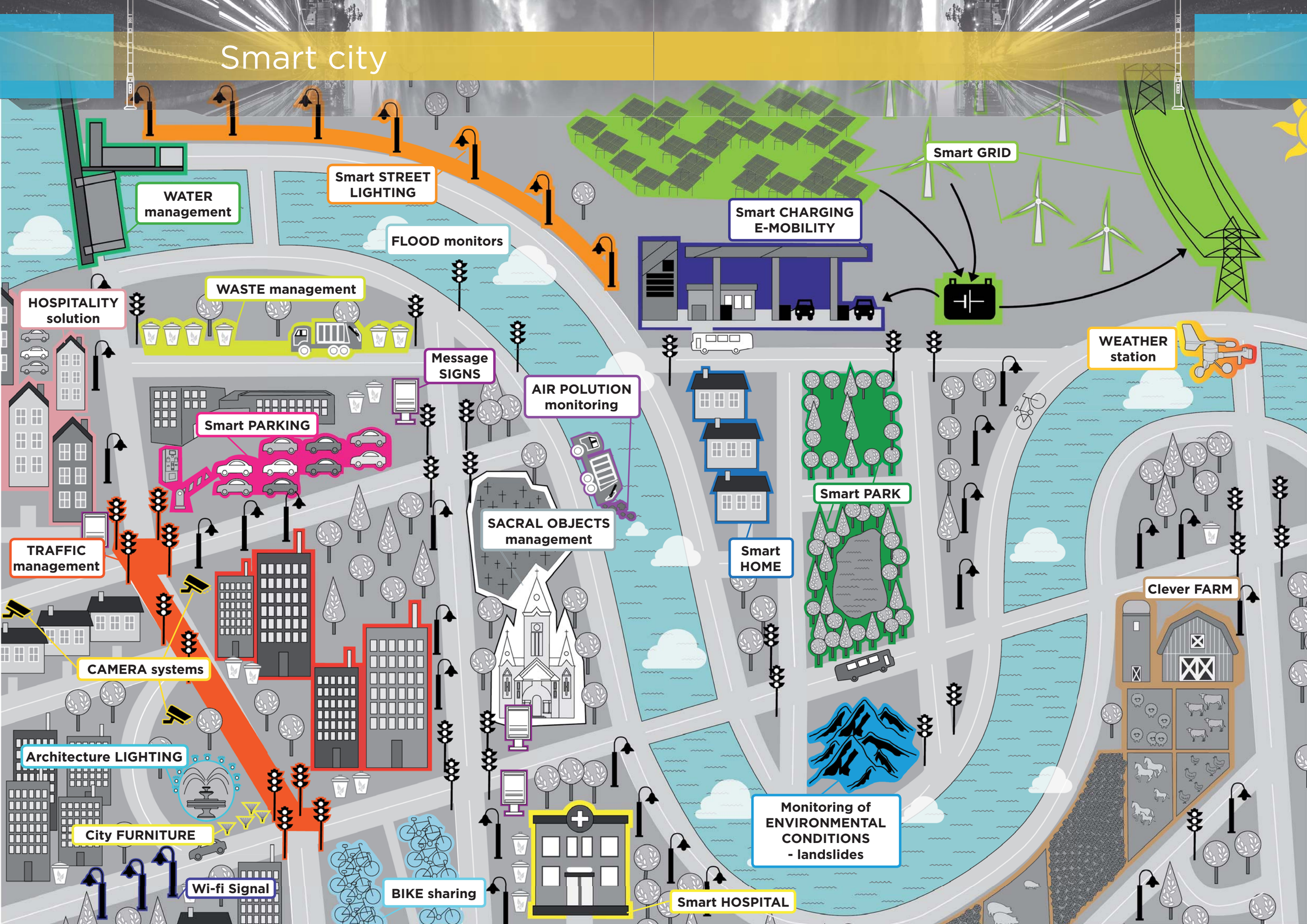
The time of electric cars is knocking on the door. Charging ahead of the long journey has never been easier than with our iNELS pole.

Infopanel

Do you want to get rid of unnecessary street signs? That's why we have a panel where you can place the name of the street on which the lamp is located.



Smart city


WATER management
Smart STREET LIGHTING
FLOOD monitors
WASTE management
HOSPITALITY solution
Message SIGNS
AIR POLUTION monitoring
Smart PARKING
SACRAL OBJECTS management
TRAFFIC management
CAMERA systems
Architecture LIGHTING
City FURNITURE
Wi-fi Signal
BIKE sharing
Smart HOSPITAL
Smart GRID
Smart CHARGING E-MOBILITY
Smart HOME
Smart PARK
WEATHER station
Clever FARM
Monitoring of ENVIRONMENTAL CONDITIONS - landslides

Hranice town

Case study

Location: Hranice, Czech Republic

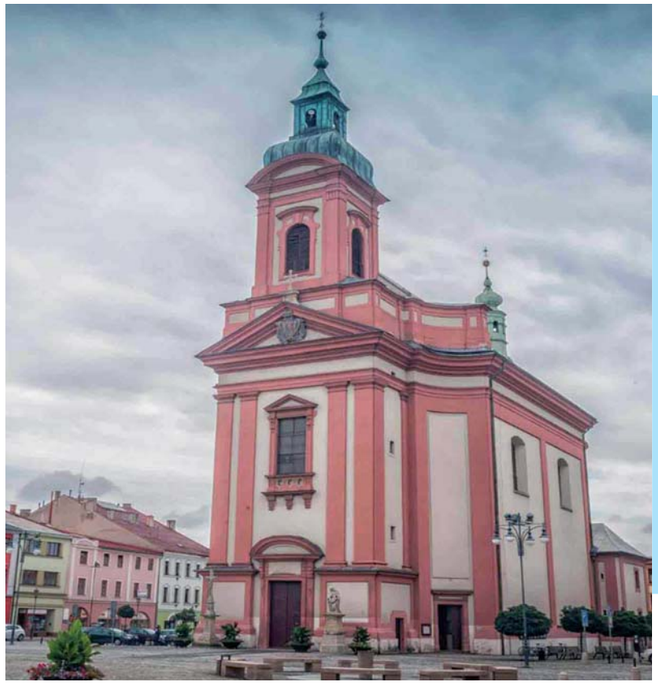
Investor: Ekoltes Hranice, a.s., city company

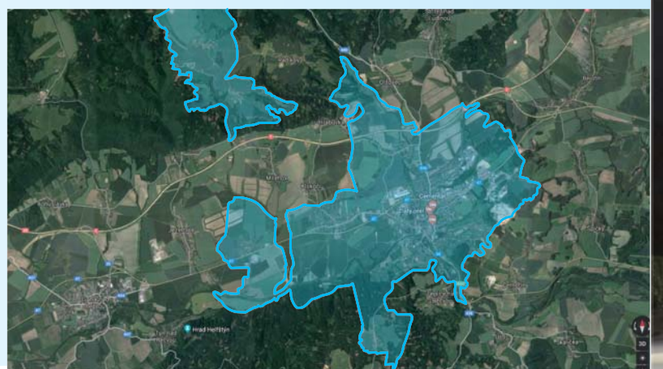
Suppliers:

Elektro-Lumen s.r.o. Hranice - lights, poles
ELKO EP, s.r.o. - control technology

Solution:

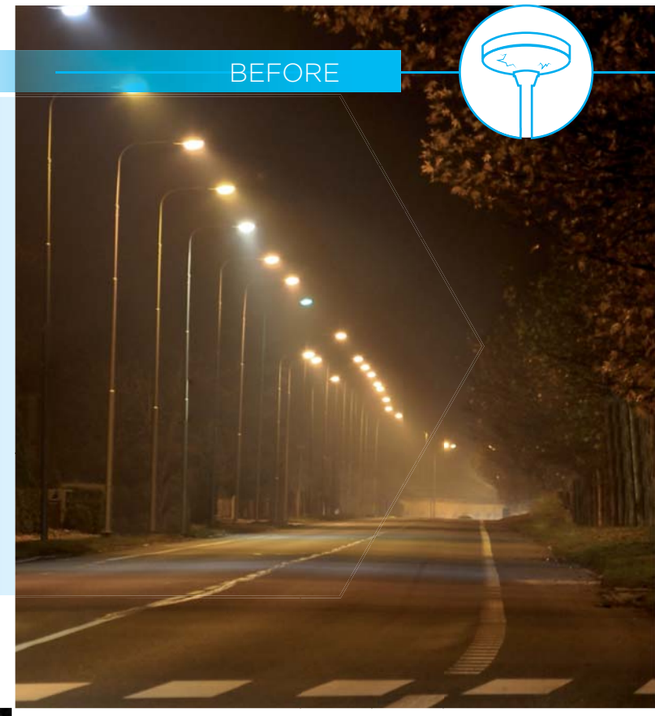
BTS broadcasting stations, monitoring and controling products, IoT platform





The original public lighting in this area was equipped with discharge lamps with sodium sources. This solution had a number of negative aspects, including inter alia higher electricity consumption. Not only that the sodium lamps themselves are consuming a lot of energy, the lights were also lit all night. This is often unnecessary, especially in the morning. Lighting controls were implemented using a twilight switch. The lighting circuit was switched on via the power control in the switchboard. But it was not able to respond adequately.

BEFORE



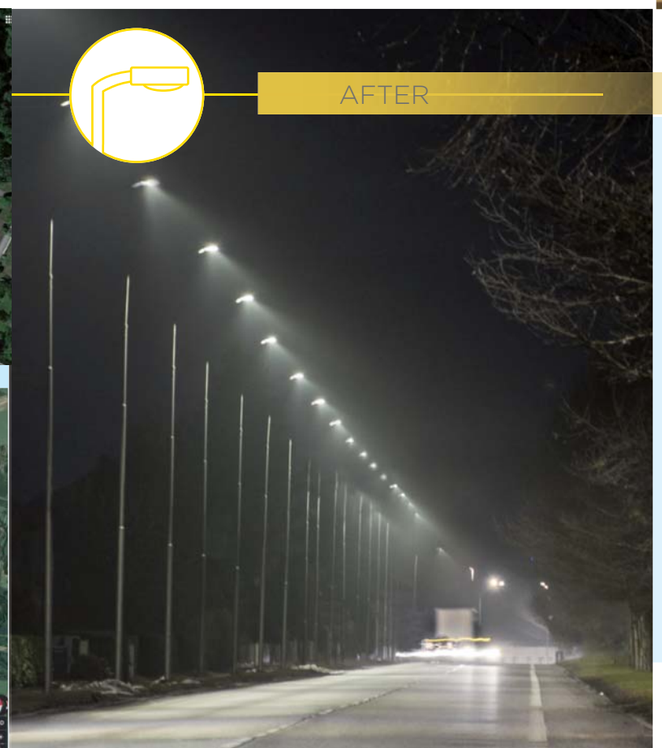
OLD LIGHTS

14 892 kWh	2000 K
power consumption	chromacity temperature
170 W	x
output	brightness control

NEW LIGHTS

4 327 kWh	4 000 K
power consumption	chromacity temperature
59 W	0-100 %
output	brightness control

AFTER



The new lights saves electricity by using more energy-efficient LED light sources and it is also set to reduce the lighting intensity by use of the time program. This can be changed at any time by the software that can also be set and configured. Of course the lamps are divided into groups, but you can control each lamp individually. The system is therefore highly variable, and it will recover the cost. All communication is secured by the local independent BTS station. It is conveniently positioned to ensure seamless communication with intelligent components installed directly on the smart light columns.

Smart street lighting

Location: Holešov, Czech Republic

Place of the instalation: ELKO EP Holding

Modern street lighting („Smart Street Light“) can work almost independently and I also think practically. In the event of a fault, it can inform itself about the repair, even incorporating a fault prediction if the light source is losing power or aging. It can respond not only to the daylight level but also to the density of the current traffic on the road or the area and accordingly adjust the intensity of the light. This reduces costs and increases security. Light sources in such lights are mainly LEDs capable of saving up to 60 percent of energy. Moreover, frequent switching or dimming does not matter.

Differences in illumination

Lights on 25%

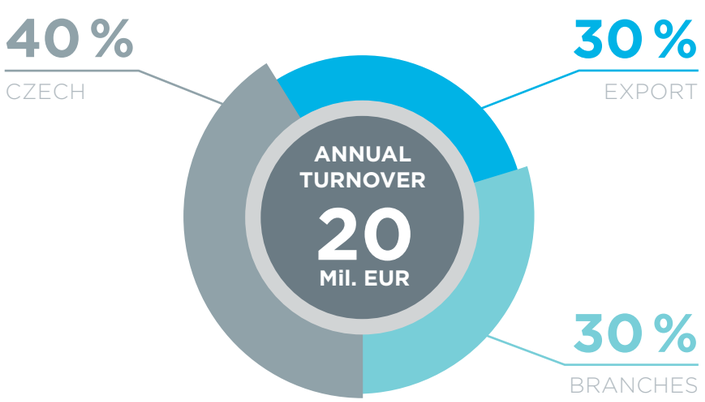
Industrial zone

Lights on 50%

Lights on 75%

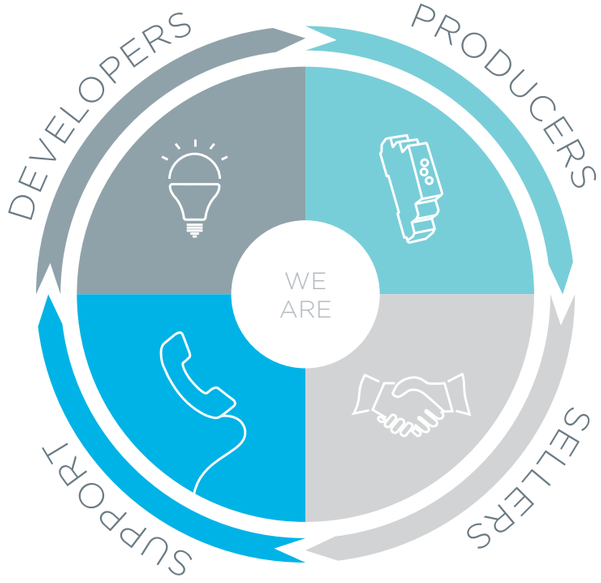
Lights on 100%

Facts and stats



17
BRANCHES
OVER THE WORLD

70
EXPORTING
COUNTRIES



330
EMPLOYEES

10 000
iNELS INSTALLATION

12 000 000
MANUFACTURED PRODUCTS

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Others just resell

HOWEVER, WE DEVELOP AND MANUFACTURE PRODUCTS OURSELVES!

25 years
on the market

14 years
ISO certification

40 developers

240 production workers

2 000 m²
manufacturing space

200 proprietary plastic molds

2
SMD lines

1 Mil.
components per day

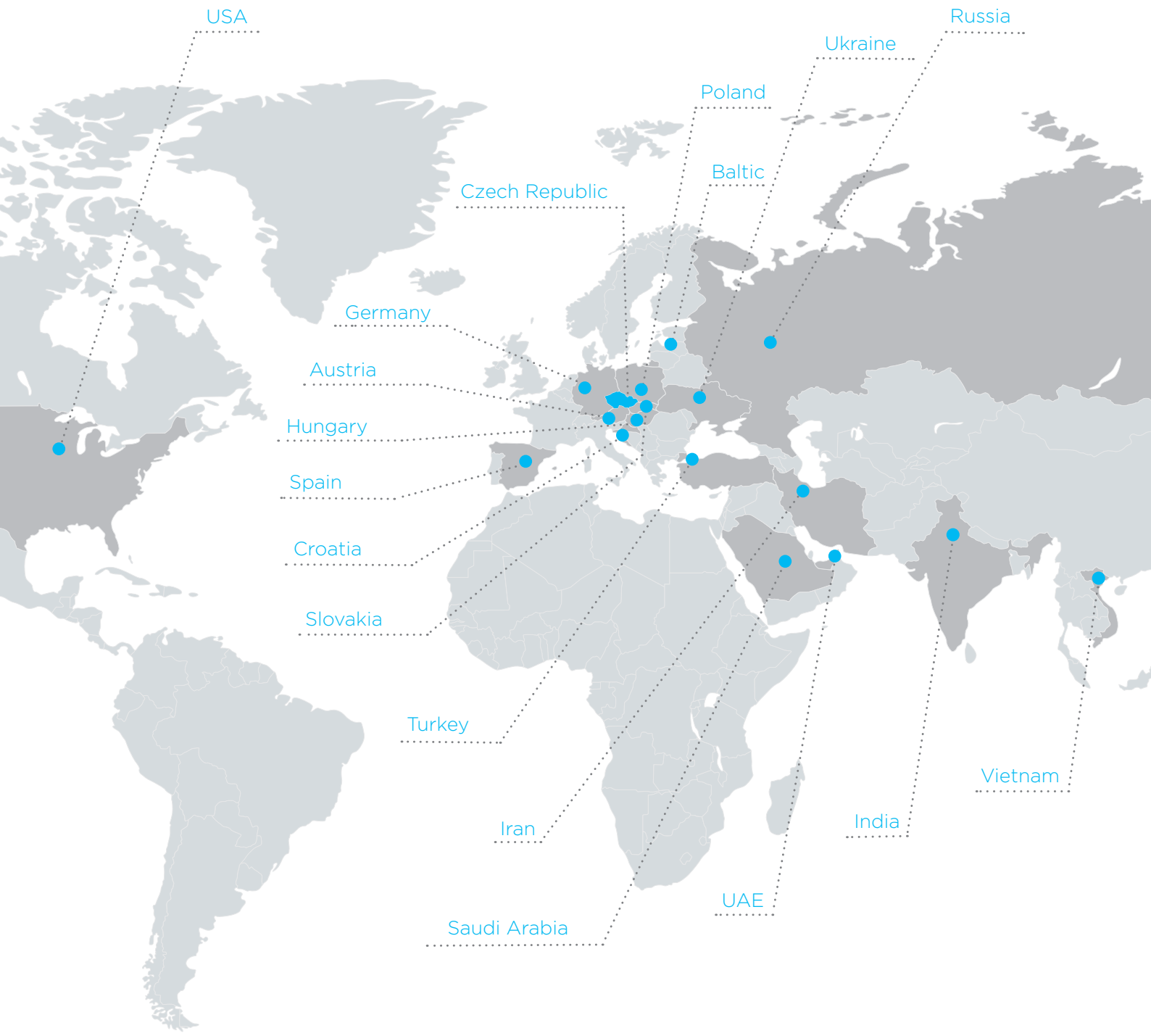
600 000
products per year

2000 m²
expedition space

2000
warehousing points

2 printing lasers

ELKO EP Holding



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