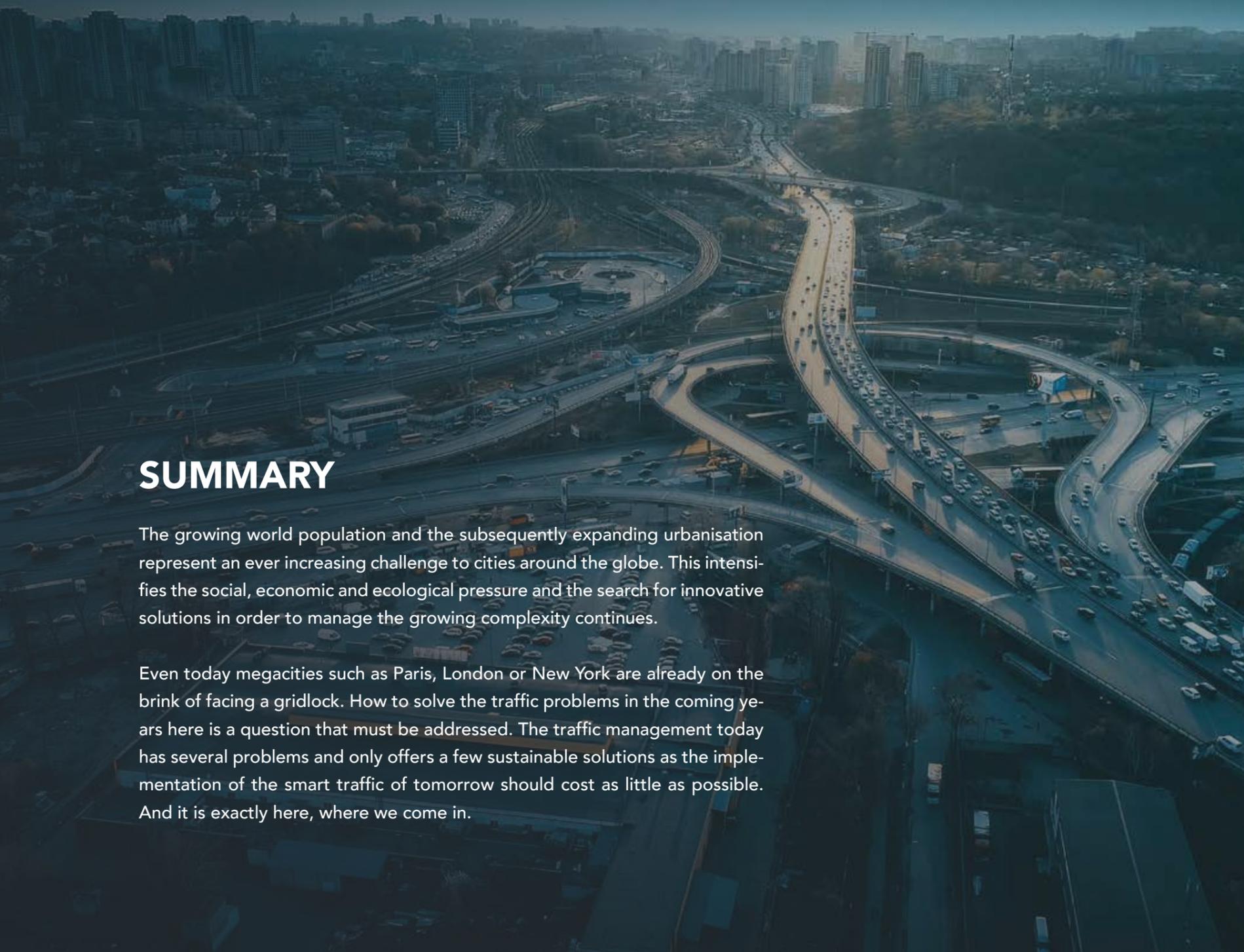


**LTS** AG

**Intelligent Traffic and Parking  
Management System**

**TAPS (traffic and parking system)**



## SUMMARY

The growing world population and the subsequently expanding urbanisation represent an ever increasing challenge to cities around the globe. This intensifies the social, economic and ecological pressure and the search for innovative solutions in order to manage the growing complexity continues.

Even today megacities such as Paris, London or New York are already on the brink of facing a gridlock. How to solve the traffic problems in the coming years here is a question that must be addressed. The traffic management today has several problems and only offers a few sustainable solutions as the implementation of the smart traffic of tomorrow should cost as little as possible. And it is exactly here, where we come in.

Based on a high level of technological competence and by deeply understanding the requirements of the urban community, LTS AG solves an urgent market problem by introducing complete modular solutions - wireless sensors for ground registration of streets and car parks (TAPS) - and thus guiding the traffic sector into the digital future.

## CONTENTS

 Problem	4
 Solution	6
 Areas of Application	10
Dynamic Traffic Management	
Intelligent Parking Management	
 Markets / Segments	12
 Pilot Projects	14
 Roadmap	16
 Core Team & Partners	18



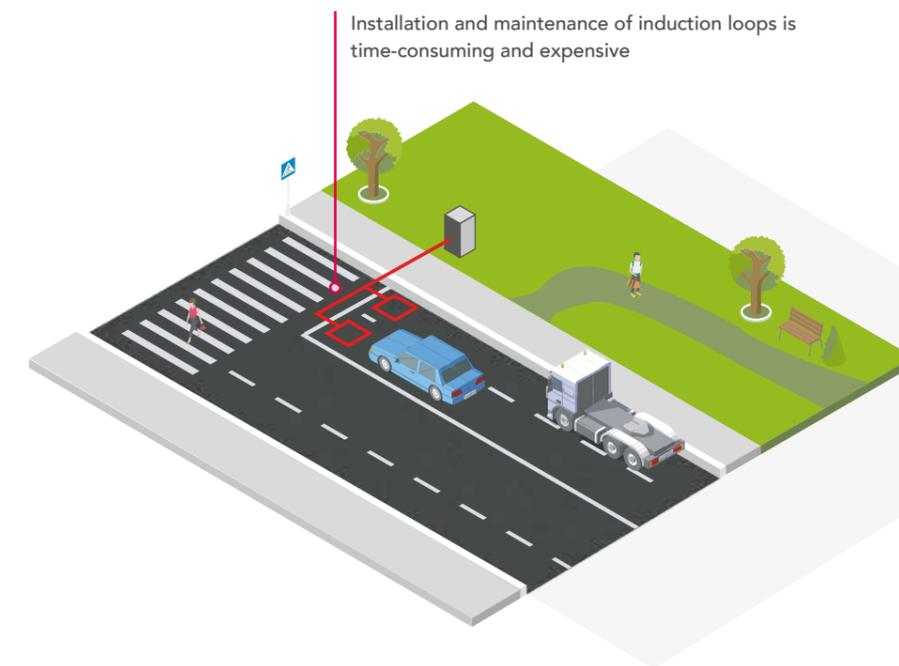
## PROBLEM



## Traffic congestion costs billions

The transport sector has so far experienced only a few innovations - compared to other sectors - and induction loops have been used in the traffic infrastructure for many decades by now. In transport technology, an induction loop serves to detect vehicles on the road. Large electro-conductive cable loops, integrated into the road surface or laid below it, are used, such as for example, in front of stopping lines of demand-driven traffic lights.

Installation and maintenance of induction loops is time-consuming and expensive. On the one hand the road surface must be milled off to a large extent and the ground dug up, and on the other hand maintenance generates high additional costs and also requires the road to be blocked off for a longer period of time - thus causing congestions and diversions in an already highly stressed ecosystem.



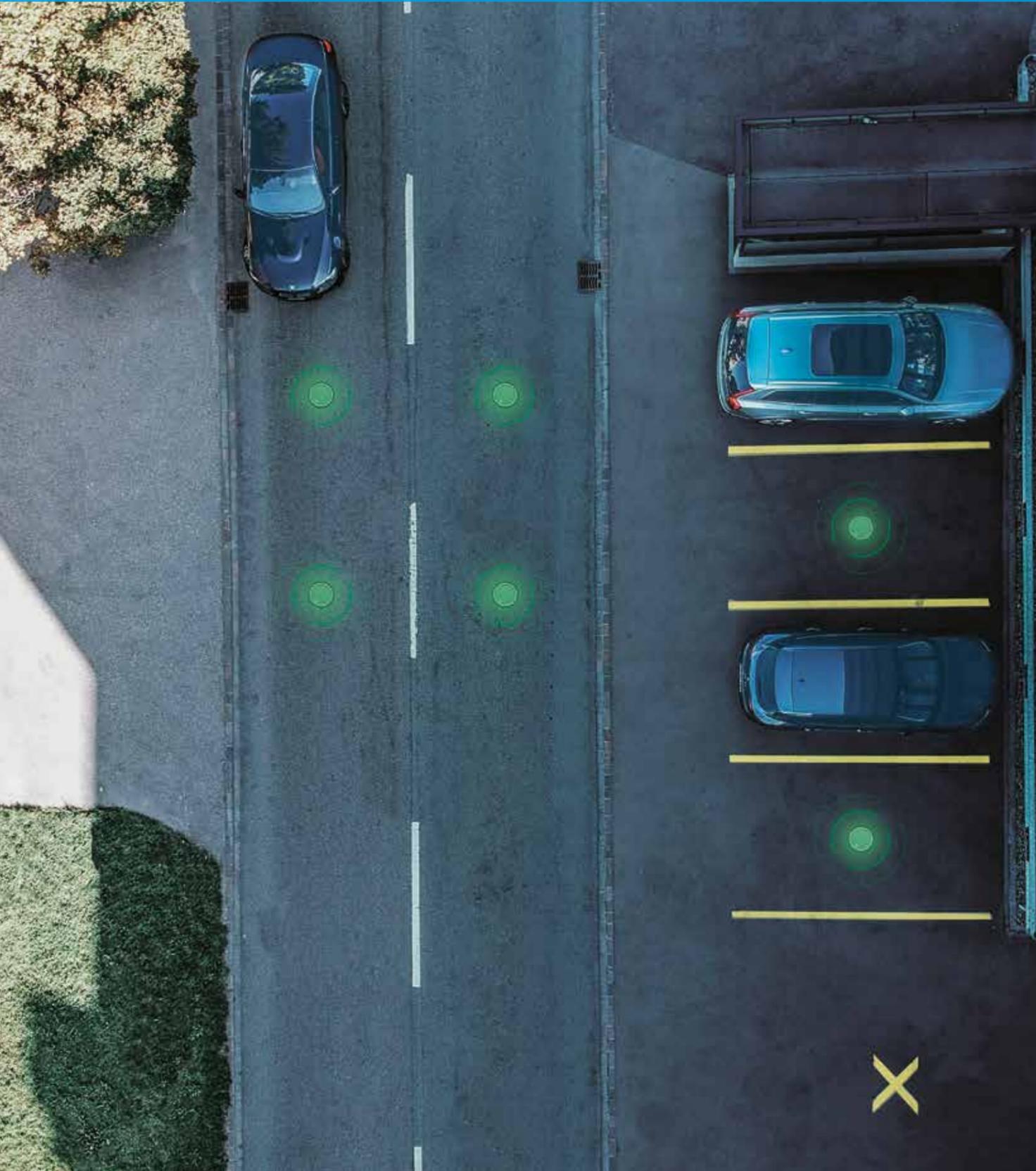
The average driver spends about 9% of his driving time in traffic congestions and thus generates, for example, additional direct or indirect costs of more than 80 billion Euros per year on a national level in Germany.

Looking for free parking spaces is the second challenge. In 2017 alone, 1.9 billion hours were wasted in Germany looking for a parking space, whereby 3.2 billion litres of petrol were used unnecessarily, causing an economic damage of more than 45 billion Euros per year. The petrol used for the search of a parking space is estimated to be about 7% of the overall annual petrol consumption for vehicles. This enormous additional petrol consumption contributes unnecessarily to climate change. Internationally viewed, these figures are even more alarming: The increasing parking space problem in the United States costs drivers US\$ 95.7 billion per year and £ 31.2 billion in the United Kingdom.





# SOLUTION



## World's first completely energy self-sufficient ground sensor

By using the smart Traffic- and Parking Management System TAPS, LTS AG offers the world's first completely energy self-sufficient ground sensor that guarantees on the one hand the exact dynamic registration of vehicles on the road and on the other hand also registers the stationary objects on parking spaces and in car parks and thus contributes essentially to an intelligent traffic management in real time.

The associated innovative energy concept of the sensor guarantees a stable autonomous supply of energy and is very well protected. In this way the ground sensor is completely self-sufficient and does not have to rely on batteries or rechargeable batteries.

This high quality and low maintenance product with a V4A casing and safety glass resists all weather influences and offers reliable protection over a period of more than ten years. Its large range of application with almost any standard interface facilitates its integration into existing traffic systems - from Lora SigFox via LTE, Wifi and optical interfaces right up to copper lines.

Beyond that, the LTS AG sensor is easily and quickly installed in the ground within approximately 30 minutes. Only a quick bore is needed to insert the sensor in the centre of the lane to be monitored. This means that roads need not be torn up on a large scale in the future. The cost-intensive installation of induction loops and cables as well as the high maintenance costs over the years will become a thing of the past. TAPS reduces the current high construction- and maintenance costs for the public domain by up to 50%.

Different sensor technology for recording objects

Innovative energy concept

Energy self-sufficient



# Energy self-sufficient, low maintenance, cost-effective

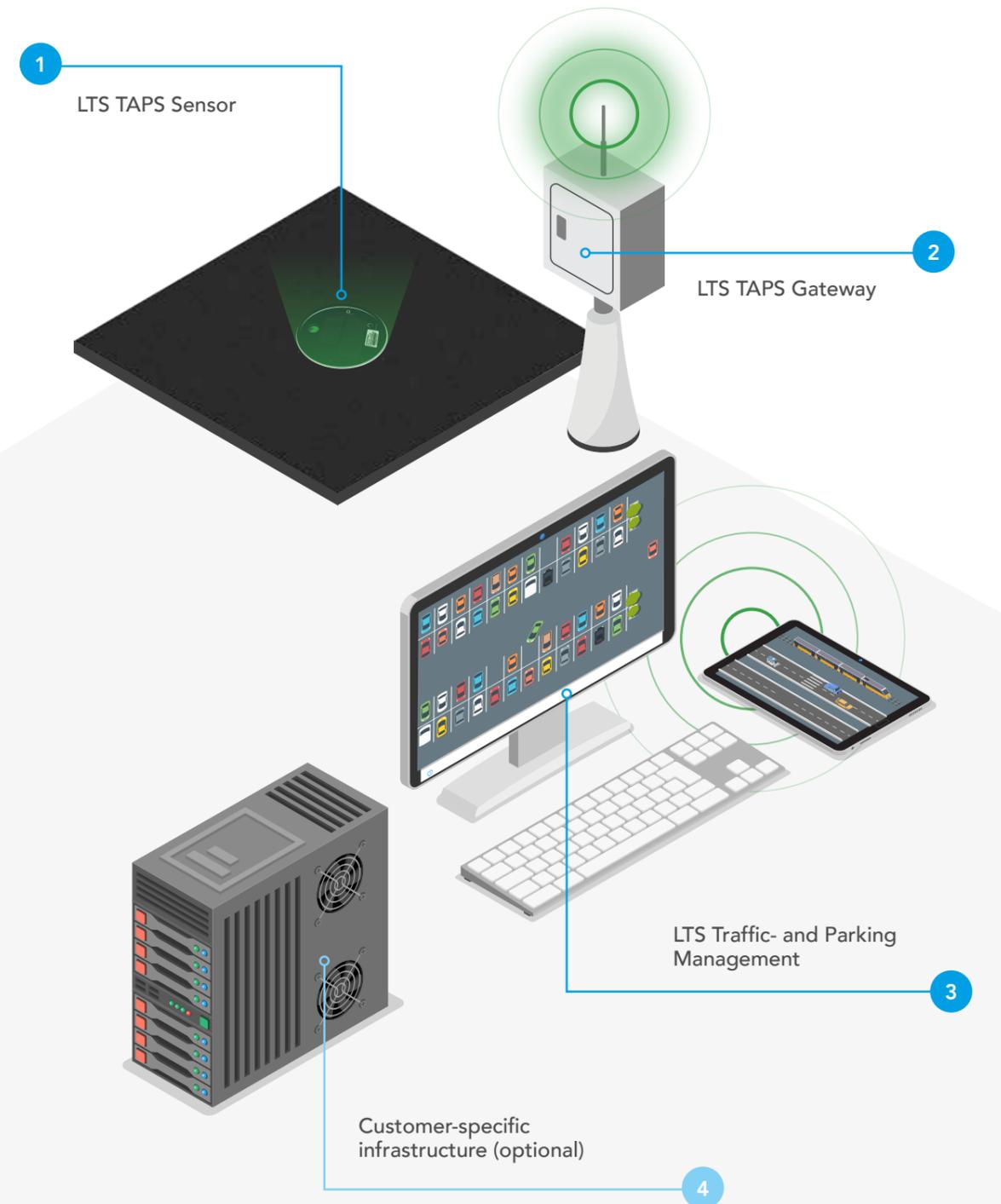
The LTS AG sensor registers the object, sends the signal received to the LTS-TAPS-gateway via a proprietary radio protocol. The vehicle recording sensor calibrates itself with the associated gateway - comparable to standard household repeaters.

Following the processing, the received data is directly transmitted to the customer-specific infrastructure (e.g. server) via the desired interface. With the user-friendly LTS-software, the desired data is called up, displayed and evaluated in real time.

Distinctly lower initial costs, lower maintenance costs, autonomous energy supply of the sensor as well as the data transmission and evaluation in real time mean that maximum flexibility is obtained in all application areas (recording, evaluation, forecast). The development of the device right up to the overall software architecture was carried out in-house.

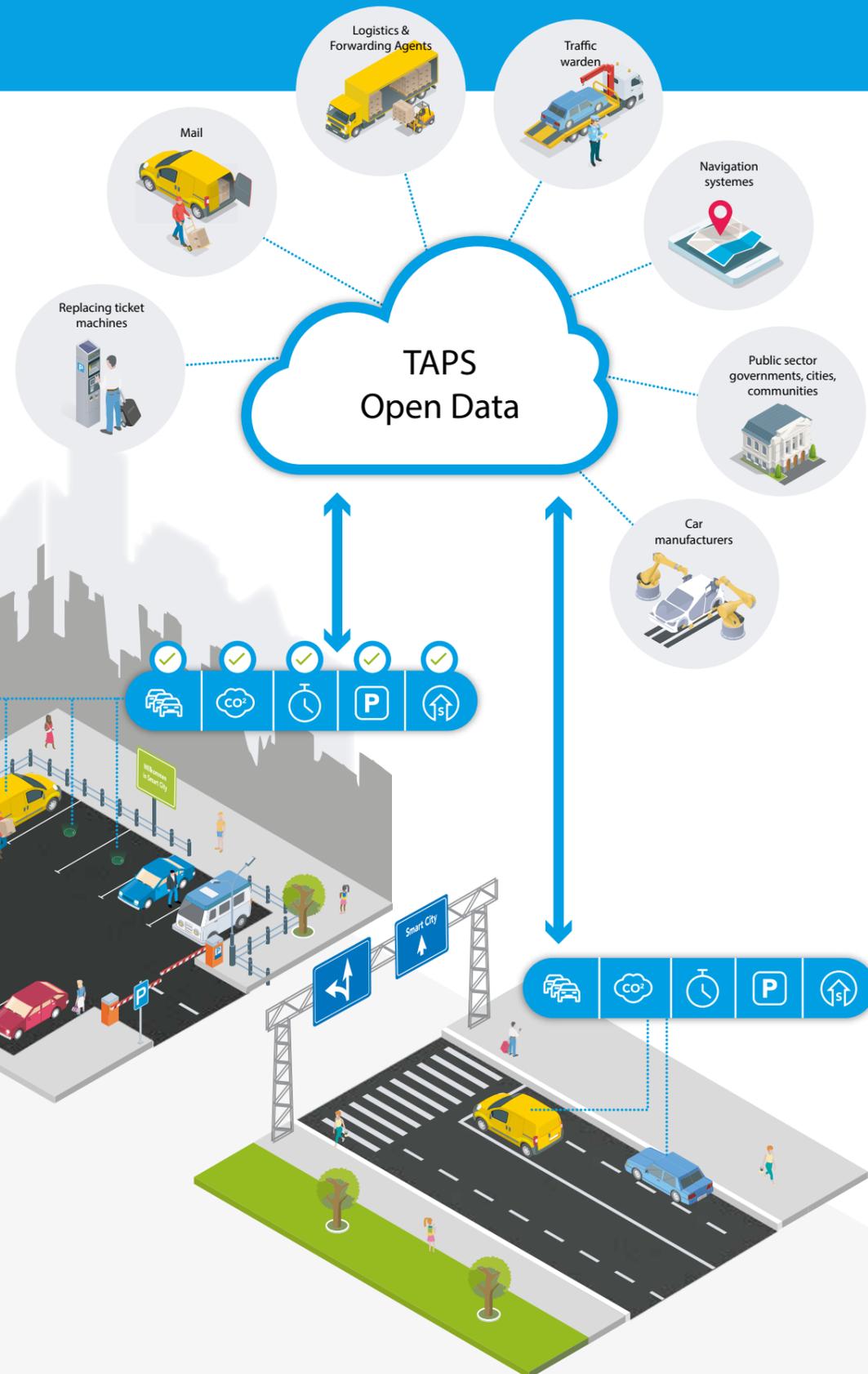
## The advantages of the sensor at a glance

- Replacing induction loops
- Short installation time
- Low maintenance
- Charging process during running operation
- Protected against environmental influences
- Different sensor technologies for recording
- Self-calibrating
- Measuring cycle can be set to specific customers' requirements
- Lower life cycle costs compared to similar products (cost efficient)
- Innovative energy concept
- Energy self-sufficient
- Data in real time





# AREAS OF APPLICATION



## Dynamic Traffic Management

One of the important areas of application of TAPS system solutions are crossroads that have to be monitored and managed. Due to the unique sensor technology it is possible to do away with the cost-intensive induction loops used so far. By using the modern LTS-system, one to two sensors as well as a gateway are installed in each lane. Compared to the distinctly costlier induction loop variation used so far, this method reduces costs by up to 50 per cent.

Apart from precisely recording the actual situation on the road, historic analyses and tendency calculations can also be carried out. Based on the company's own intelligence system (GUI), TAPS offers a cost-effective and reliable entry into the world of IoT (Internet of Things) and thus a dynamic traffic management. This technology can be extended as needed, and in this way it creates a basis for integral innovations in large areas of application of forward-looking traffic management (e.g. diversions, emergency lanes etc.), adaptive management of congestions, forecast and planning maintenance work, traffic census or temporary use of road construction light signals.

## Intelligent Parking Management

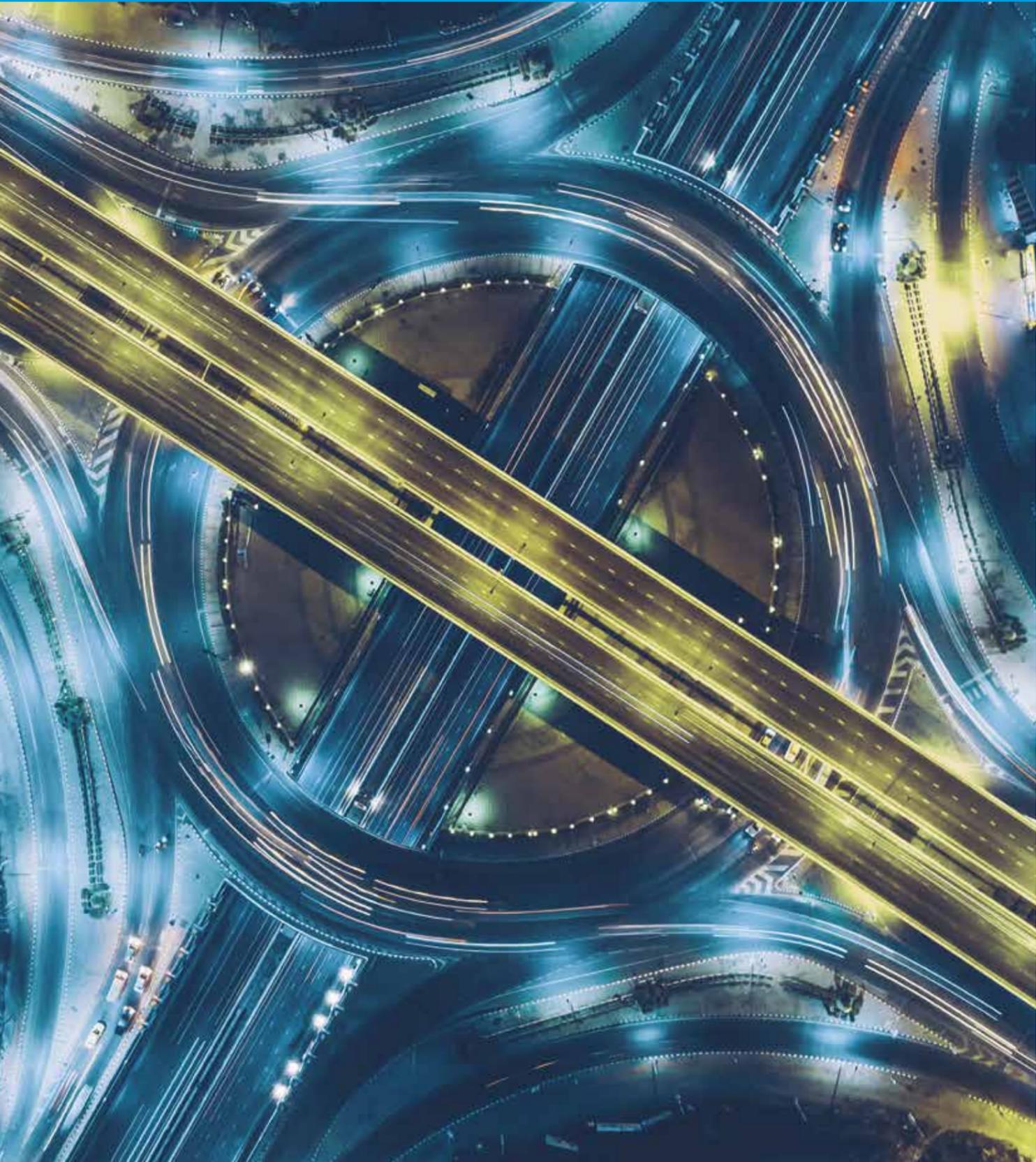
Consequently, managing parking spaces means that the parking space of the future will be a completely integrated part of the mobility chain. A problem of today's cities is that the number of vehicles looking for a parking space surpasses the available number of spaces. This excessive demand often leads to an increased traffic of wandering vehicles and thus increases noise- and environmental pollution.

The data (parking area free or full) ascertained by the LTS-TAPS-parking sensor is directly and automatically transmitted via the LTS-TAPS-Gateway to the processing software. The operator of the parking infrastructure is now able to evaluate and manage the parking behaviour with the LTS-TAPS analysis tool. App-technologies support the communication between operator and customer.

Our platform is able to collect real-time data from third party providers and to make these available to the various end customers. In this way additional costs in the search for a parking space are reduced, as also the detrimental production of CO2 while at the same time the ease of looking for a parking space is considerably increased.

Additional customer-specific areas of application, such as for example, car park monitoring and controlling the gates of company premises, can also be optimised.

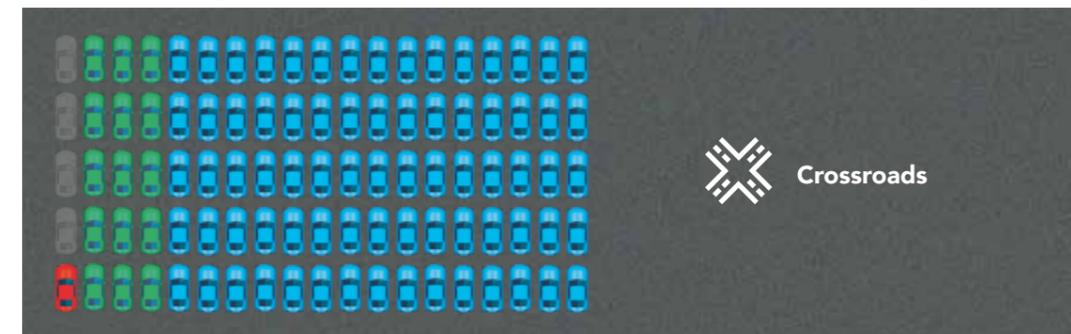




## Huge Future Market

Traffic management will become an important economic factor worldwide. New intelligent traffic systems that take over the managing and monitoring of crossroads as well as traffic lanes and parking spaces will be generating billions in the future.

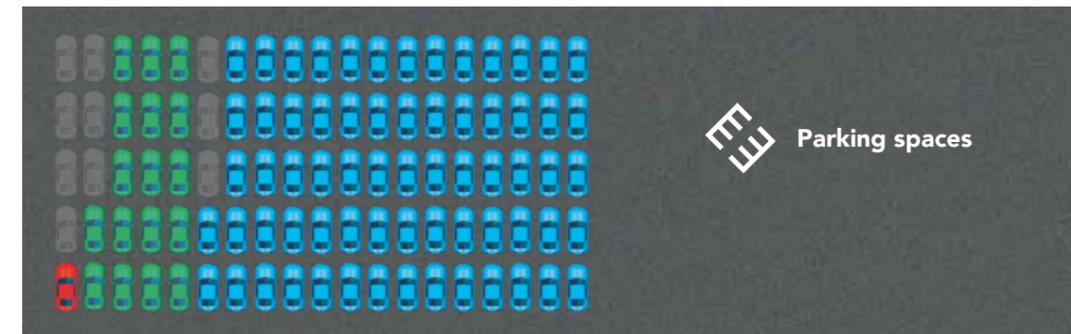
Europe has more than 6 million crossroads and the demand for intelligently managed traffic becomes considerably more forceful every year. Switzerland alone has more than 80,000 crossroads, access roads to highways and motorways as well as a considerable amount of construction traffic in the cities - with an increasing tendency. For the LTS sensor solution alone, the market potential in Switzerland is estimated to be more than 400 million Swiss Francs; the German-speaking area (DACH) has a potential of more than 4 billion Swiss Francs. Consequently, linking the LTS hardware with software solutions handling issues such as congestion management in the German-speaking region has an even higher market potential.



**Switzerland:** 80,000 crossroads  
Turnover potential: 440 million CHF

**DACH:** 1.2 million crossroads  
Turnover potential: 4.2 billion CHF

**Europe:** 6 million crossroads  
Turnover potential: 21 billion CHF



**Switzerland:** 500,000 parking spaces  
Turnover potential: 425 million CHF

**DACH:** 8.4 million parking spaces  
Turnover potential: 7.1 billion CHF

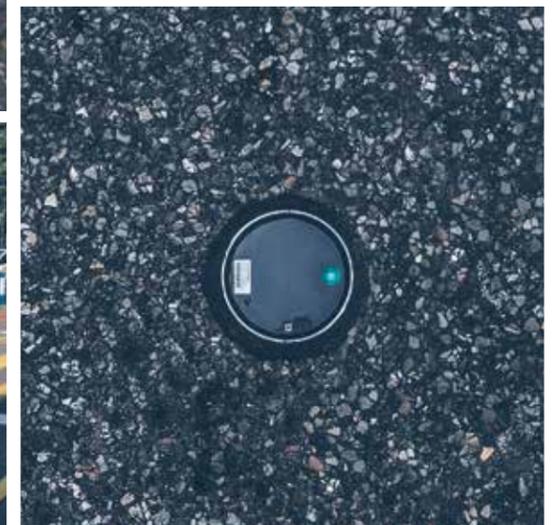
**Europe:** 33.7 million parking spaces  
Turnover potential: 28.6 billion CHF



## PILOT PROJECTS

## Convincing in practice

The TAPS pilot projects of the LTS AG impressed partners of the transport industry and public domain by proving its practicability and the huge market potential. Ground sensors were installed at several locations to convince interested parties of its easy handling and functionality. The strong response has already generated concrete enquiries for international pilot projects through which technology will be sold and/or large sales volumes are to be expected.



## The road to success

- The basic development took place between 2017 and 2019. The first pilot projects were successfully installed in Switzerland in 2019.
- Due to the high demand generated by the Google campaign, we will increase our sales starting in 2020. More pilot projects. More results. More customer-specific solution integrations.
- We expect the first orders in 2021, and 2022 will see the first deliveries for large projects and/or the first licence contracts.
- We consider ourselves to be technology providers. Accordingly, our focus in 2022 is on licence contracts of the existing technology for large concerns.

2019

- Basic development finalised (2017-2019)
- Pilot projects CH
- Expansion, development and sales

2020

- International pilot projects
- Focussing on expanding the GUI
- Increased expansion, development, and sales

2021

- More pilot projects
- Evaluating pilot projects & customer-specific continued development
- First orders

2022

- Delivery of large projects
- First license contracts

2023

- Delivery of large projects
- Training licence partners and first licence contracts



# CORE TEAM & PARTNERS



## The Core Team



**Dr. Thomas Langer**  
Phil. I  
Chairman of the Board/CEO



**Emanuell Tomes**  
BSc in Business Information Technology  
Member of the Board/Software Development



**Prof. Ing. Georg Bruegger**  
Teaching Electronics, Digital Signal Processing, Computer Technology, and Mathematics, various international consultation mandates, Head of Development



**Daniel Britt**  
BSc in Electrical Engineering  
Hardware- und Software development

## Partners & Customers



### Disclaimer

Although LTS-AG is anxious to give correct and up to date statements, we cannot guarantee and warranty that the information given in this handout is correct and complete and herewith reject any form of liability evolving from its use. Any statements made in this presentation not referring to historic facts, are considered to be statements made for the future which do not guarantee in any way future performances; they contain risk and uncertainties, including, however, not restricted to future global business conditions, exchange rates, legal regulations, market situations, activities of competitors as well as other factors that are beyond the control of the company. None of the financial information has been checked.

### Property of the Contents

The information may only be copied as a whole or in parts or passed on to third parties with our explicit permission in writing. Statements made in this presentation are the intellectual property of LTS-AG and are subject to confidentiality. The company is entitled to claim damages in case of any violations.

# CONTACT

**LTS AG** | Industriestrasse 15 | Aadorf, Switzerland  
office@lts-ag.ch | www.lts-ag.ch

**LTS**<sup>AG</sup>  
Light Technic Solution