Enviro
Technology Services Ltd

part of CuraTerrae

OPUS REMOTE SENSING

The problem

1. **Air pollution** is the **fourth leading cause of death** in the world and road transport is one of the main sources of pollution.

2. Just **1%** of vehicles are responsible for up to **40%** of total emissions from road transport.

3. **There is no control** over these vehicles and **reliable data** on transport emissions **are not used** to design efficient policies. Most policies to reduce transport emissions today are not **effective** neither **fair**.

The solution

To **measure** the **real emissions** of vehicles in real-world conditions, to:

1. Make decisions based on empirical data.

2. Design targeted policies, acting selectively on every individual vehicle based on their real-world emission levels.

01

ABOUT US

Remote sensing experts

About us

OPUS REMOTE SENSING

The world's only ISO-17025 accredited company for the remote measurement of real-driving vehicle emissions


Acreditación

ENAC
Entidad Nacional de Acreditación

Otorga la presente / Grants this

ACREDITACIÓN
1035/LE2117

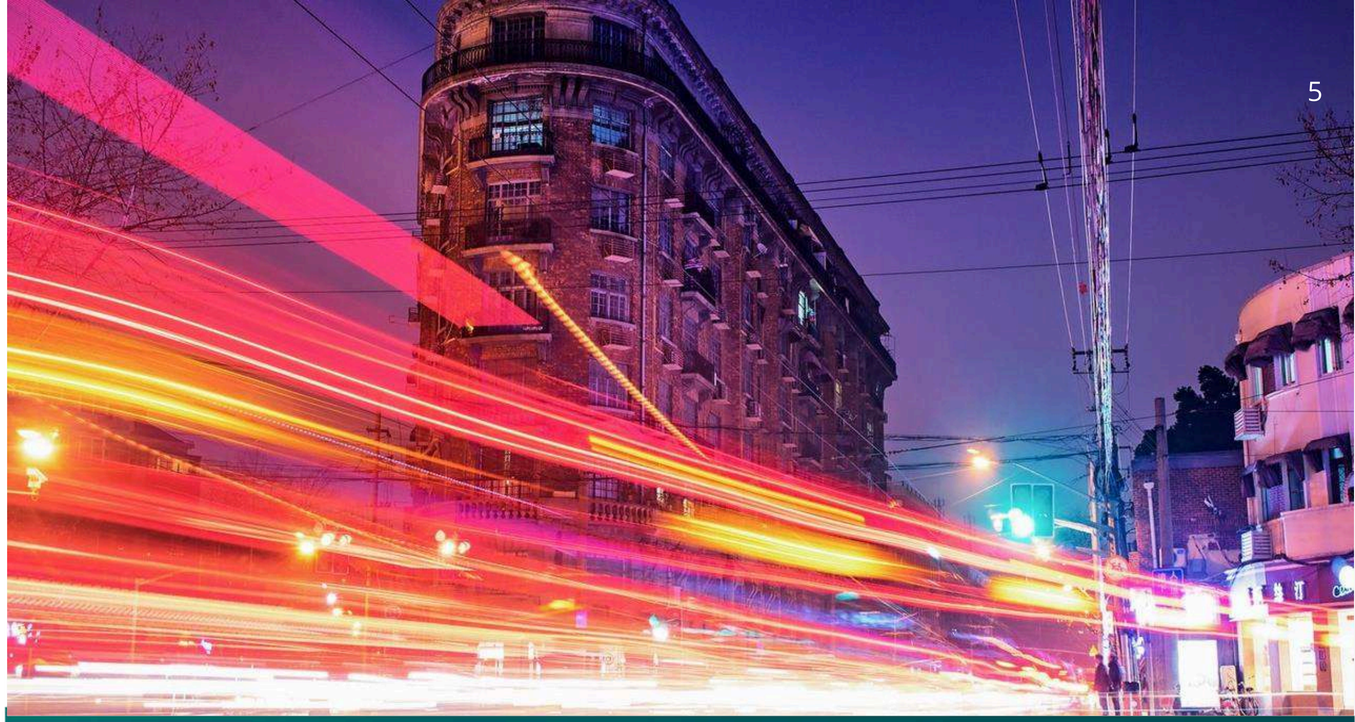
a la entidad técnica / to the technical entity

OPUS REMOTE SENSING EUROPE, S.L.

Según criterios recogidos en la Norma UNE-EN ISO/IEC 17025, para la realización de Ensayos en el Sector Industrial definidos en el ANEXO TÉCNICO adjunto.
According to the criteria in UNE-EN ISO/IEC 17025 for the performance of Test in the Industrial Sector as defined in the attached Technical Annex.

Fecha de entrada en vigor / Coming into effect: 10/01/2014

D. José Manuel Prieto Barrio
Presidente

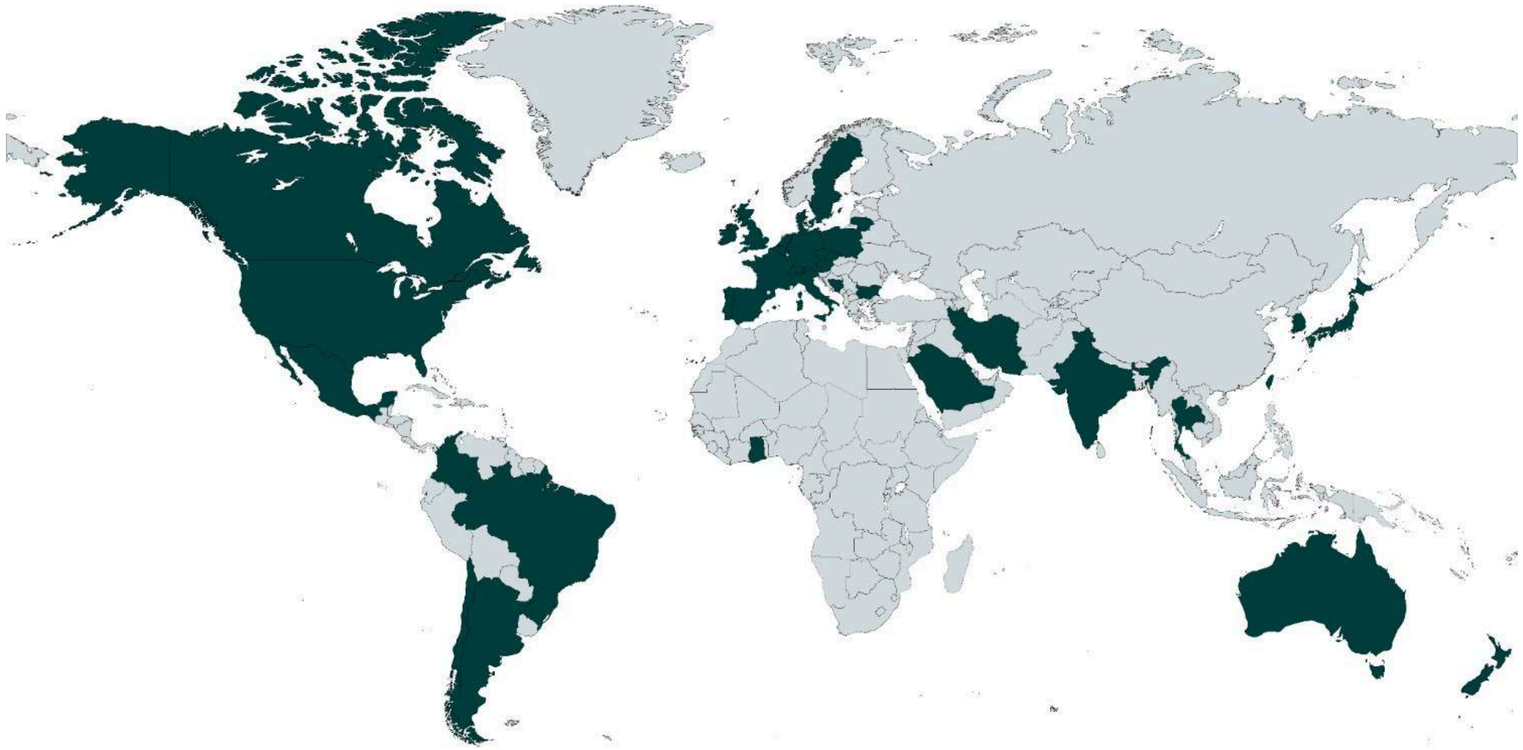


Key value offering

- Unique technology: sale or renting.
- Services for the measurement & control of road traffic emissions.
- Providers of different solutions: consulting, research, smart city, Low-Emission Zones…

About us

OPUS REMOTE SENSING



- Headquarters in Madrid, Spain.
- ISO17025 laboratory.
- R&D facilities.
- Production center: all devices are manufactured in Madrid.
- Logistics center: support to all clients globally, repairs, calibrations, etc.

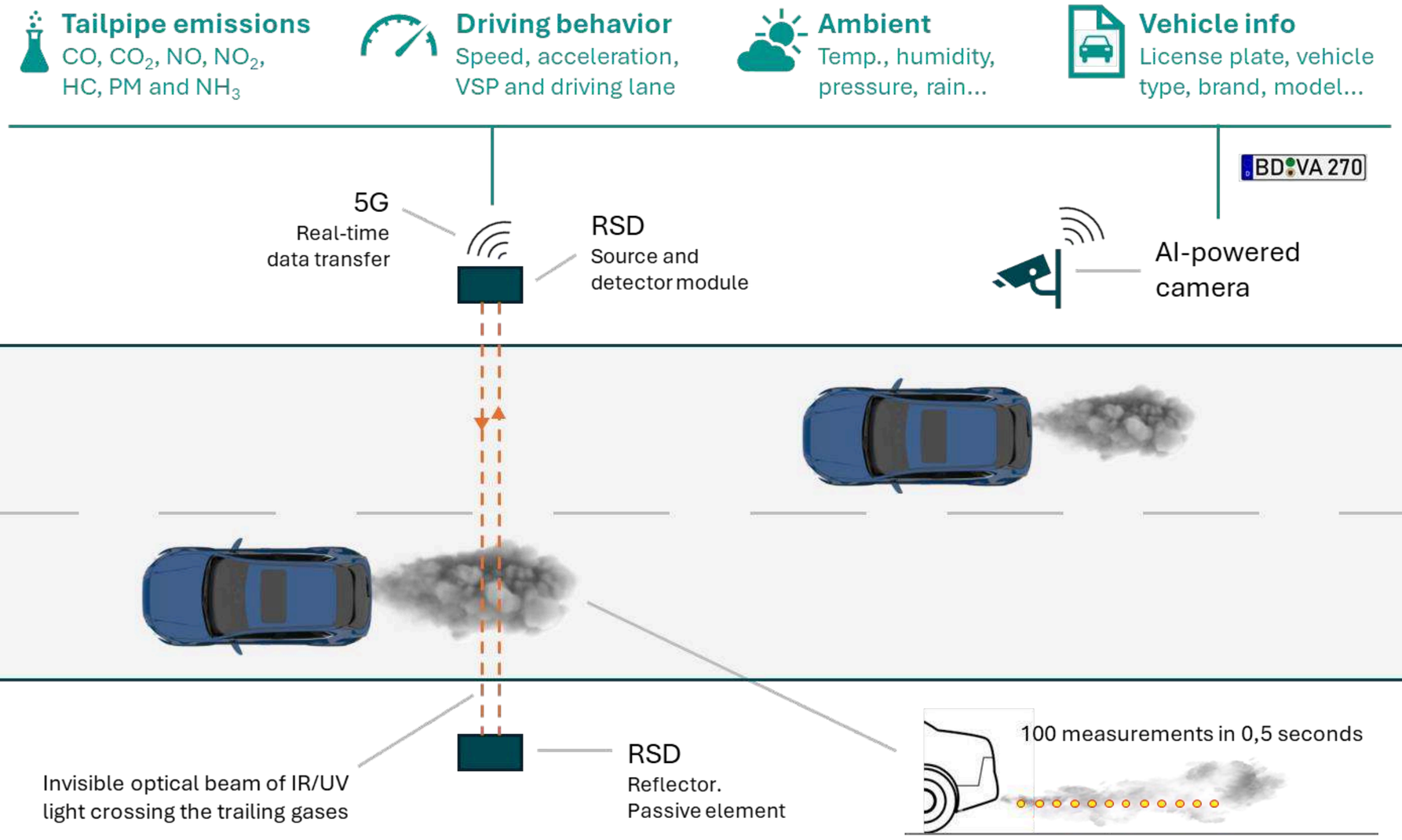
Experience in the 5 continents. Millions of vehicles analyzed every year. Global leader in vehicle emissions remote sensing.

02

TECHNOLOGY

Vehicle emissions remote sensing devices

RSD - Remote Sensing Device



TECHNOLOGY

PORTABLE

For flexible & itinerant monitoring.
It can monitor more than 1 lane.

- The most widely used remote sensing instrument in the world.
- No road modification. No preparation. No infrastructure. Quick & easy setup.
- Internal batteries for 24-hours continuous operation. 4G/5G data transfer.
- Deployed & calibrated in 20 minutes.
- A few devices can cover a whole territory.

TECHNOLOGY

FIXED

For 24/7 monitoring at key locations.
Integration with other sensors and communication systems.
It can monitor more than 1 lane.

- Remote Sensing cabinets to measure in a fixed location. Fully autonomous.
- Especially appropriate to control access ramps into motorways or Low-Emission Zone access streets.
- Different options. The cabinets are customized.

RSD 6000

Opus latest instrument, RSD600, can be housed in protective cabinets for a fixed installation. This solution allows 24/7 operation with zero human intervention. OPUS is installing fixed systems in different places of Spain in very different and demanding environments. All these units are operating continuously.

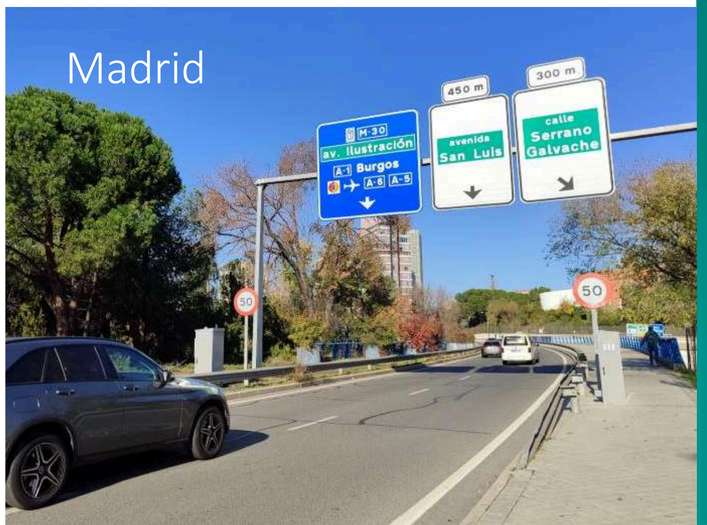

Coruña


Granada

- Urban and motorway sites.
- 1 or 2-lanes simultaneous monitoring.
- Speeds up to 160 km/h.
- Integrated with other sensors and platforms (smart city & tolling)


Irún

Barcelona

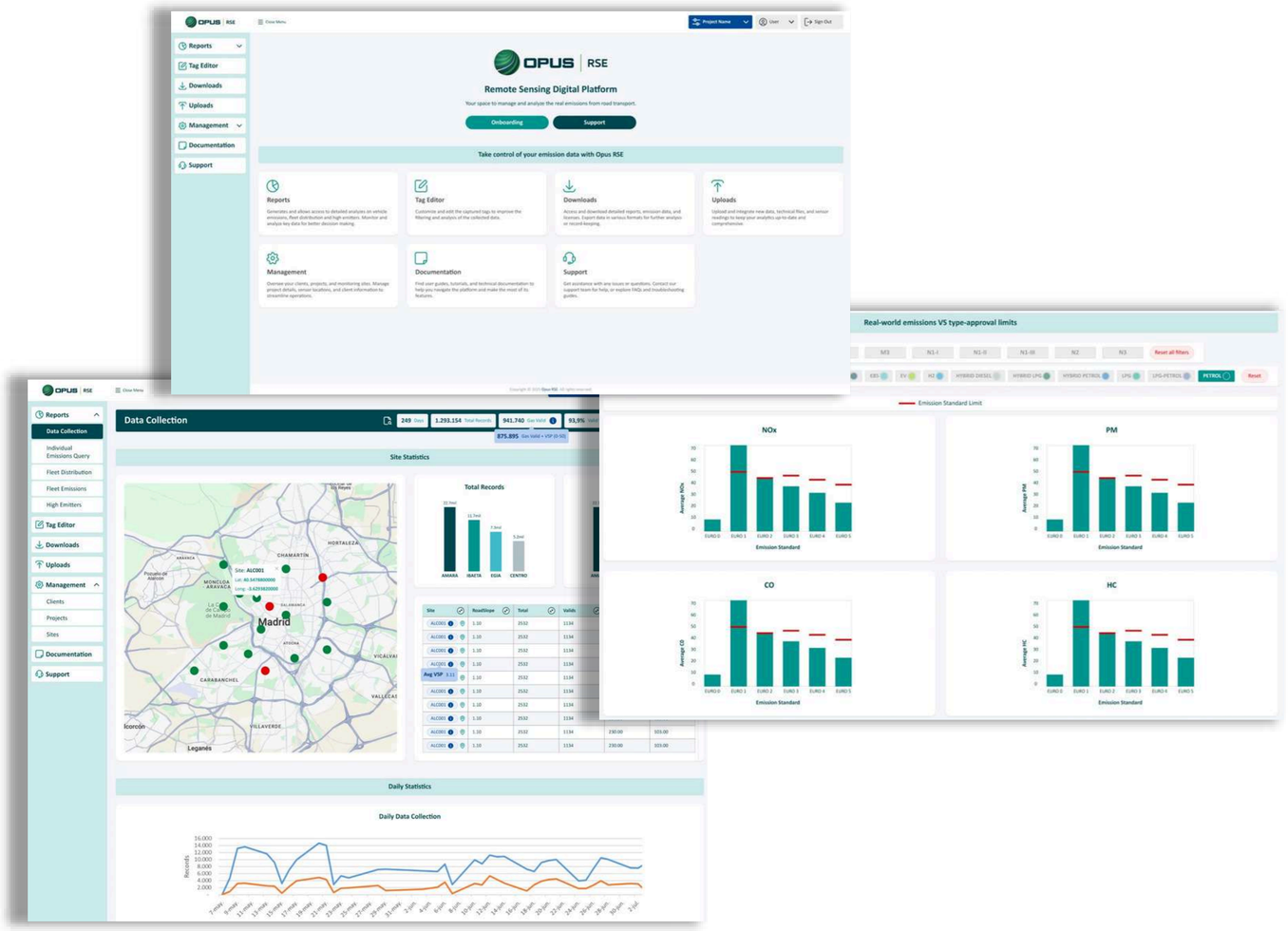


Madrid

IP 65 protection and real-time control

Rain sensor and door to automatically close the cabinet in the rain

Air conditioning. RSD stable temperature despite extreme high or low temperatures.



TECHNOLOGY

OPUS DATA PLATFORM

A web service for the comprehensive processing and analysis of real-world traffic emissions:

- ✓ Analyze data collection
- ✓ Process, import and export data
- ✓ Explore the vehicle mix distribution
- ✓ Analyze emissions distributions
- ✓ Compare real-world vehicle emissions with type-approval limits.
- ✓ Identify and analyze high-emitters
- ✓ …
- ✓
- ✓
- ✓

Real Data. Valuable insights. Smart decisions.

TECHNOLOGY

REAL-TIME MONITORING ANYWHERE

4G/5G

Smartphone / tablet

Remote access to any device for checking or remote control of the monitoring network.

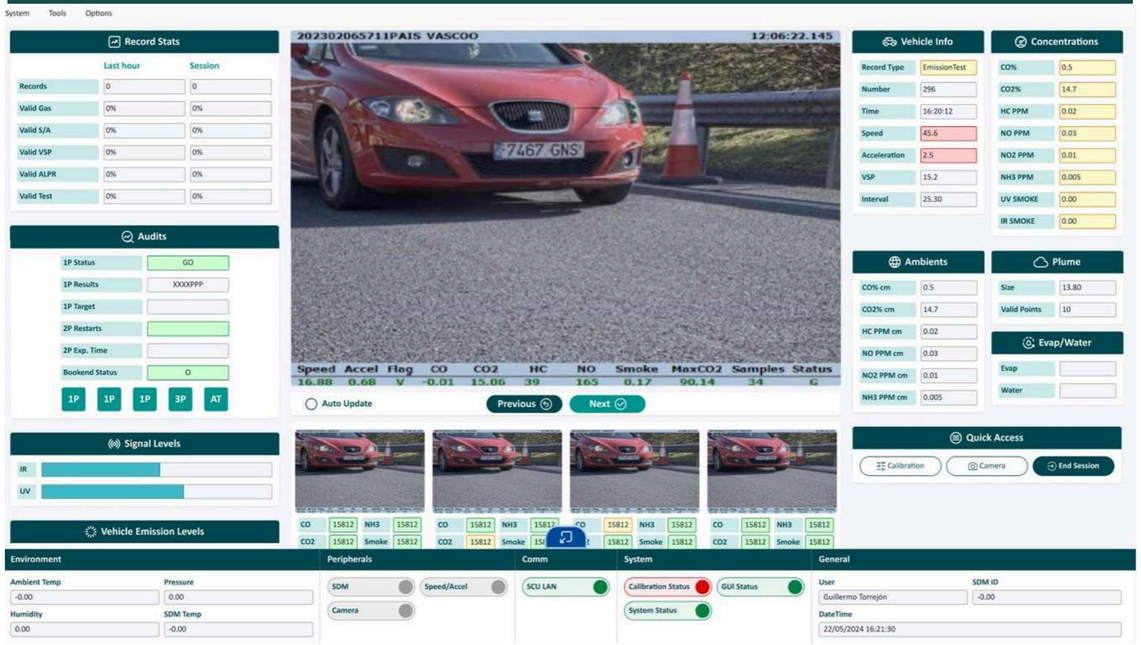
User interface - access data capture from each RSD in real-time

General statistics

Emission level of the vehicle

Low *Med* *High*

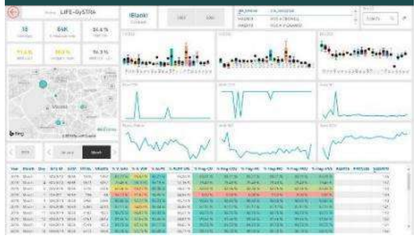
Previous vehicles readings



Speed
Acceleration
VSP

Emission concentrations:
CO, NO, NO2, HC, PM, NH3
Ambient conditions

Back-office dashboard



A panel to check the performance, status and data statistics of each device in real-time.

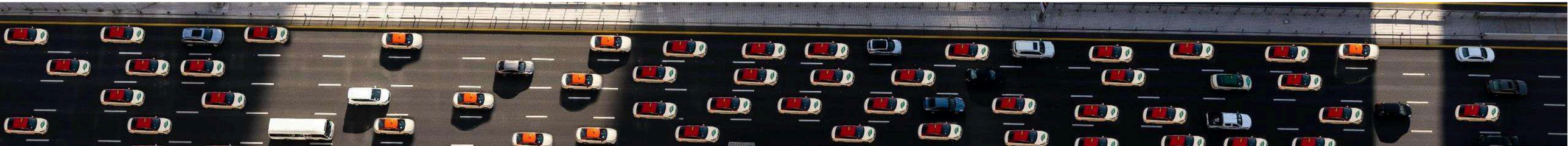
TECHNOLOGY

OPUS SENSING DRIVE

Opus proprietary Artificial Intelligence technology to analyze every detail of individual vehicles in real-world conditions:

- √ Vehicletype(SUV, sedan, motorcycle, truck…)
- √ License plate Reading Vehiclespeedand
- √ accelerationmeasurement Vehicle VSP
- √ calculation Brand and model Body color
- √ License plate color

The RSD camera can be enhanced with Opus Sensing Drive technology. All the captured information is available in real-time.



03

SOLUTIONS

Real data, real solutions

REMOTE SENSING SOLUTIONS

1

Real-world emissions characterization

Real data, smart decisions

2

High & Clean screening

Identification and control of individual extremely polluting vehicles or rewarding the cleanest vehicles in the fleet

3

Roadside inspections

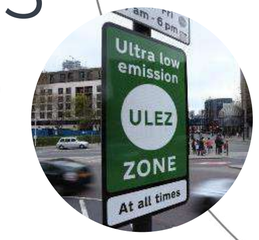
Real-time police enforcement on illegally manipulated vehicles

4

Fleet control

Monitoring of specific fleets

5



Urban access schemes

LEZ and smart tolling

6

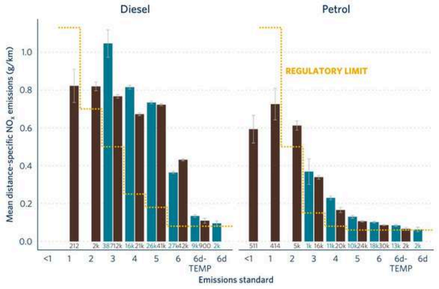
Smart City Solutions

Digitalization and connectivity

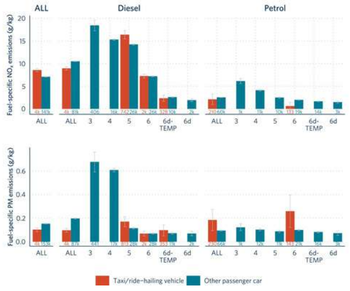
SOLUTION #1

REAL-WORLD EMISSIONS CHARACTERIZATION

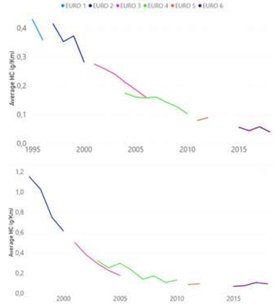
Measurement and analysis of actual traffic emissions in a territory to make better decisions



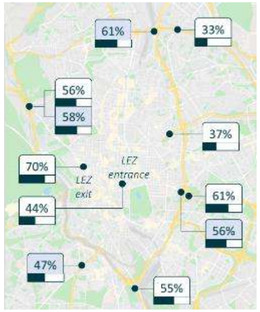
Market Surveillance



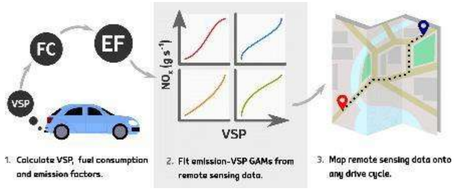
Vehicle groups studies



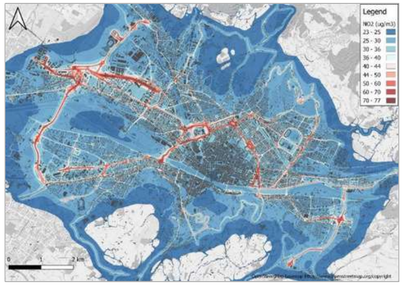
Deterioration & tampering



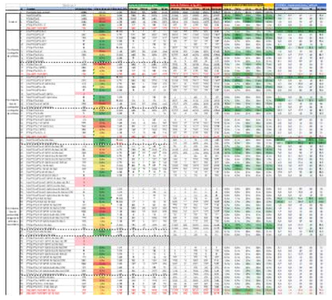
Hybrids performance



Update Em. Factors



Improve AQM

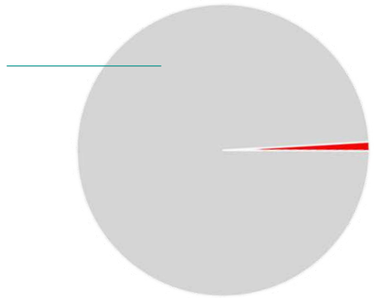


Simulate scenarios

Design new policies

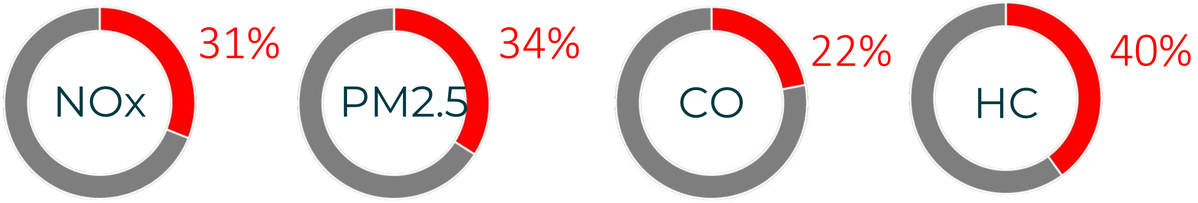
SOLUTION #2

HIGH-EMITTER IDENTIFICATION



1% of the most polluting vehicles

Are responsible for up to **40%** of all emissions produced by road transport:



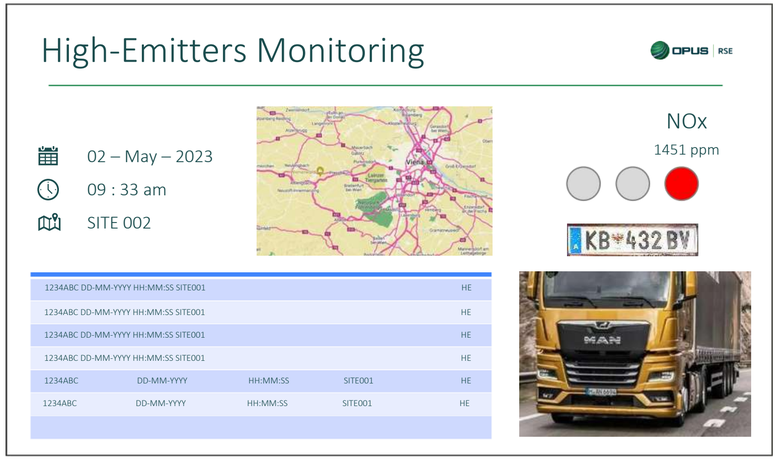
Find high-emitters ▶ Reduce up to 40% of transport emissions

- √ Countries like China, South Korea and USA include remote vehicle emissions inspection. Vehicle emissions are screen in public roads, not only at PTIs. High-emitters found by RSDs are automatically sanctioned or sent to urgent physical inspections. The cleanest vehicles get a “clean certificate” – owners can skip their next programmed PTI.
- √ Different studies have shown the effectiveness of detecting both dirty and clean vehicles.
- √ Recent cost-analysis studies have shown that the benefits of these programs outweigh the costs of the program and the costs of repairing the vehicles.

SOLUTION #3

ROADSIDE INSPECTIONS

Using the RSD as an alert system

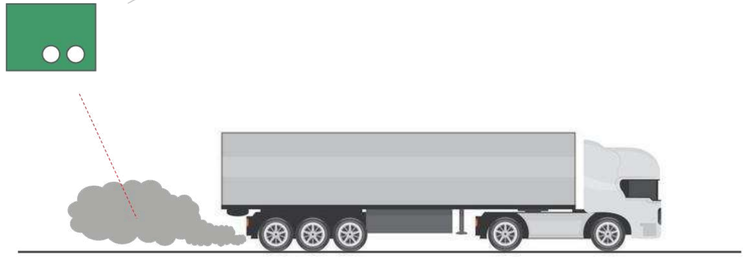


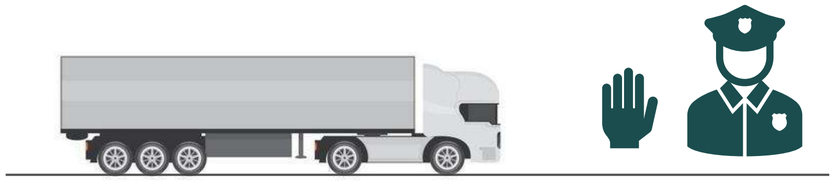
1 The RSD measures the vehicle's pollutant emissions

2 If it is identified as a potential tampered vehicle, an alert is emitted to the police

3 The truck picture and license plate is included in a monitoring system. This info is stored so that all high-emitting trucks can be controlled later

4 The police can pullover the truck, or intercept it, in any other place. ALPR cameras can be used to track the vehicle after its identification

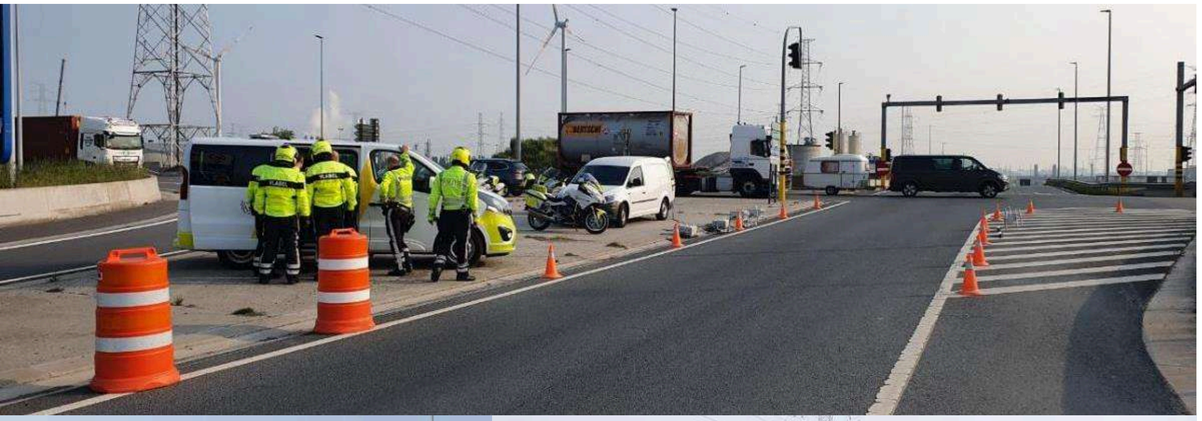




SOLUTION #3

ROADSIDE INSPECTIONS

Example: Port of Antwerp



Police success rate in finding tampered vehicles

Blind inspection = 2%

RSD alert = 52%

Using Opus RSD as a warning system increases the probability of finding an illegally tampered truck by 25x times compared to a blind inspection

SOLUTION #4

FLEET CONTROL

Continuous monitoring and predictive maintenance. Examples of some success stories

Employees' cars

GRUPOMASMOVIL

Employees and leased vehicles with high emissions were identified. Some were repaired and others were converted to electric. The reductions achieved by the company were quantified. This action helped the company to become a B-Corp and CO2 neutral company.

More info

Trucks

MAHOU SANMIGUEL

The emissions of the heavy vehicle fleet are audited every 1 to 2 years in Spain's main logistics center. The company itself thus audits whether its fleet of vehicles is increasingly respectful of air quality. Individual high-emitting trucks are identified, and the company investigates the vehicle and the subcontractor.

Public buses

TRANSPORT SCOTLAND · RICARDO Ricardo Energy & Environment

The Scottish Government spent millions of pounds retrofitting older buses in the hope of reducing their emissions. Ricardo E&E used Opus RSDs to measure actual emissions, finding discrepancies against plan.

More info

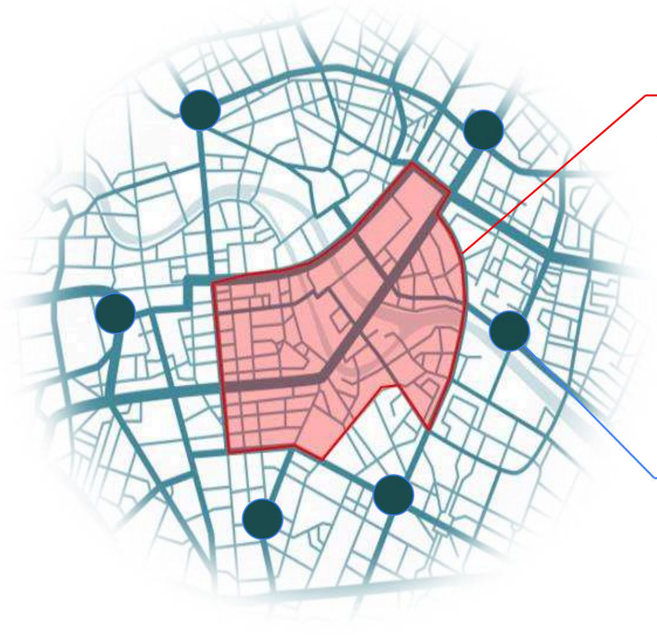
Urban delivery vans

Dualfuel ECO SOLUTIONS

We evaluated the real-driving emissions of delivery trucks in different configurations: original diesel engine, Dual-LPG-retrofit and Dual-CNG-retrofit. The company responsible of the retrofitting was DualFuel, who applied their propietary "Dual Fusion" modifications. The results showed a reduction of unburned hydrocarbons and NOx emissions by a factor of up to 3.

SOLUTION #5

URBAN ACCESS SCHEMES



Low-Emission Zone

All entry points are controlled by license plate reading cameras.

Integrated platform for continuous enforcement

Remote Sensing Network

Fixed, portable and semi-fixed sensors monitor all road traffic on a metropolitan scale

High-Emitter

Restricting entry, parking or increasing access fees

Low-Emitter

Positive actions, such as allowing temporary access or reducing access or parking fees

Access restrictions

A) By vehicle type and age

If the vehicle is very old, it is considered to be too polluting, and its access to city center is restricted.

B) By real-driving emissions

Alternatively, and even complementary to the previous method, empirical measurement by the RSD can be used to fine-tune access policy: fairer and more effective restrictions.

Charging methods

An urban toll can also be implemented to charge the entrance to the city. The emission levels of each vehicle can be a factor in increasing or decreasing the fee.

SOLUTION #6

SMART CITY SOLUTIONS

Integration with other sensors

- Combined measurement of noise and emissions for each vehicle
- Combination with DAVAO: emissions per passenger
- IntegrationwithALPR camera network

VIDEO

Real-time information

- To check the status of each RSD and analyse the data in real time
- Personalised messages to the driver's smartphone or to vehicle's OBU
- Variable message board signs within metres of the RSD

VIDEO

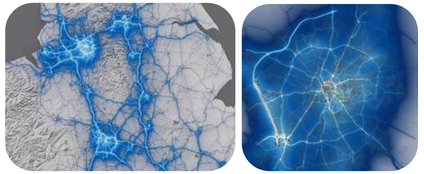
Integration with Traffic Modelling & Management

- Modelling and simulation of traffic emissions from real-world emissions data
- Integration with traffic centre or integrated management platforms

VIDEO

Integration with Air Quality Modelling

- Realistic and very detailed emission factors for each vehicle group
- RSD-enhanced dispersion models for better prediction and modelling of air quality



More info

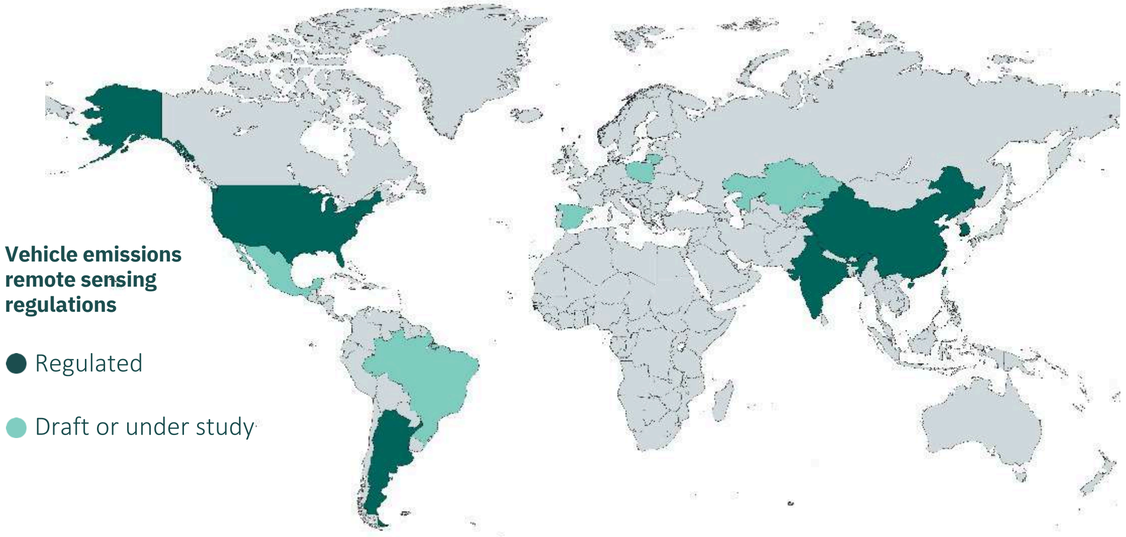
04

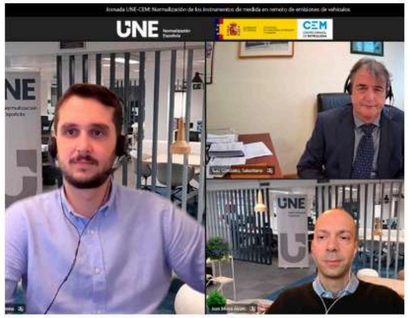
REGULATION

UNE

Vehicle emissions RS standard

- The Spanish Association for Standardization, UNE, and the Spanish Metrology Centre, CEM, are developing a **UNE standard for instruments used for vehicle emission remote sensing**.
- This pioneering standard, to be published at the end of 2024, will harmonize this type of instrument in Spain, and develop a **basis for future regulation.**
- As any UNE standard, once published in Spain, it will be **easily adopted or replicated** by other countries.





CEM promotes a UNE standard for the remote measurement of vehicle emissions

08/11/2023

- This pioneering national standard, which is scheduled for publication towards the end of 2024, has arisen from the need expressed by some councils of cities with more than 50,000 inhabitants, and will be useful for Low Emission Zones (LEZ).
- The aim of the initiative is to harmonise this type of instrument in Spain, and develop a basis for future regulation in this area. Technical standards are a useful tool for public agencies in the effective development and deployment of public policies.

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