

OPUS REMOTE SENSING

Measurement and control of real-world traffic emissions

www.opusrse.com



The problem



one of the main sources of pollution.





are not effective neither fair.



Air pollution is the fourth leading cause of death in the world and road transport is

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

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



The solution

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



Make decisions based on empirical data.



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







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





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.



TECHNOLOGY

Vehicle emissions remote sensing devices

RSD - Remote Sensing Device











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.







- 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)



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.



Real Data.

Valuable insights.



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

Smart decisions.

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TECHNOLOGY **REAL-TIME MONITORING** ANYWHERE



Smartphone / tablet



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

Back-office dashboard



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

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	Acceleration	2.5	NO2 PPM	0.01		
	VSP	15.2	NH3 PPM	0.005		
1	Interval	25.30	UV SMOKE	0.00		
55			IR SMOKE	0.00		
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	H Ar	nbients	\diamond	Plume		
	CO% cm	0.5	Size	13.80		
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Speed Acceleration VSP

4G/5G 🔊

Emission concentrations: $CO, NO, NO_2,$ HC, PM, NH_3

Ambient conditions



TECHNOLOGY OPUS SENSING DRIVE

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

- ✓ Vehicle type (SUV, sedan, motorcycle, truck...)
- ✓ License plate Reading
- ✓ Vehicle speed and acceleration measurement
- ✓ 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.





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SOLUTIONS

Real data, real solutions



Smart City Solutions

Digitalization and connectivity



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Urban access schemes

LEZ and smart tolling

REMOTE SENSING SOLUTIONS

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

Roadside inspections

Real-time police enforcement on illegally manipulated vehicles

Fleet control

Monitoring of specific fleets



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



Update Em. Factors



Improve AQM





Deterioration & tampering



Simulate scenarios



Hybrids performance

Krakow announces Low Emissions Zone in region first, supported by TRUE real world emissions testing



Design new policies





SOLUTION #2 HIGH-EMITTER **IDENTIFICATION**

Rest of the fleet

1% of the most polluting vehicles

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



✓ Countries like China, South Korea and USA include remote vehicle emissions inspection. Vehicle emissions are screen in public roads, not only at PTIs. Highemitters 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.

40%



ROADSIDE INSPECTIONS

Using the RSD as an alert system



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

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





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.



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 highemitting trucks are identified, and the company investigates the vehicle and the subcontractor.









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

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

By vehicle type and age A)

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

By real-driving emissions B)

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

Integration with ALPR camera network

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









Integration with Traffic Modelling & Management

Modelling and simulation of traffic emissions from realworld emissions data

Integration with traffic centre or integrated management platforms

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



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.









Real Measurements. Efficient solutions.

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