Noise and **E**missions
MOnitoring and Radical Mitigation

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D8.2 - Methodology for charging and access

WP8

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Abbreviations and acronyms

Acronym	Description
RSD	Remote Sensing Devices
PTI	Periodical Technical Inspection
EU	European Union
WLTP	Worldwide Harmonised Light Vehicle Test Procedure
RDE	Real Driving Emissions
ICCT	International Council on Clean Transport
NEDC	New European Driving Cycle
PN	Particulate Number
NOx	Nitrogen Oxide

Executive Summary

The deliverable, which is part of Work Package 8 on impact analysis, is essential for the project to have an overview of different policies in the context of gaseous emissions and noise emissions detections coming from individual vehicles. The deliverable was conducted via desk research and interviews of the different stakeholders of the project, including both internal ones (i.e. other partners) and external ones (e.g. European Environmental Bureau).

With close to 380,000 premature deaths linked to air pollution in Europe every year, this paper delves into explaining the role of Remote Sensing Devices in helping identify polluting vehicle and helping cities and member states ultimately tackle the air pollution problem. The chapter on air pollution presents different policy options that are present at EU and city level and how the technology the NEMO project has developed is present. The conclusion on remote sensing devices in relation to real world application is that there are several policy options available, and are further explored in the final chapter.

For noise emissions the picture is also clear: in Europe alone around 113 million citizens every year are exposed to harmful traffic-related noise which can lead to health complications. As for the section on air pollution, this section explored different policy options for road transport and rail related noise emissions. The conclusion of the section was that there is a fragmented picture on noise emissions with little often done to prioritise citizen's wellbeing.

The deliverable concludes with a chapter on methodology for charging and access exploring different options for RSD in real-life scenarios related to the NEMO project.

1 Introduction

1.1 Purpose, scope and target group

This document aims at providing an overview and assessment of policy options that tackle emissions and noise measurements of individual vehicles. Where applicable, the document also presents where opportunities exist for remote sensing technologies like the ones developed by the NEMO project in a legislative context. The document considers policies across the EU and highlights where gaps may exist based on current knowledge.

1.2 Contribution partners

Table 1: Contribution of partners

Partner nº and short name	Contribution
RIC	RICARDO AEA LIMITED
OPUS	OPUS RS EUROPE S.L
MBBM	MÜLLER-BBM GMBH

1.3 Relation to other activities in the project

Table 2: Relation to other activities in the project

Task	Description
8.1.3	White paper written and published that proposes best practises to deliver the 30% improvement in AQ and 20% reduction in noise.
8.5	Economic evaluation of mitigation scenario

2 Current landscape: air quality

In the European Union (EU) alone, every year close to 380,000 premature deaths are linked to air pollution[1]. Most recently, the European Public Health Alliance estimated the health costs of air pollution caused by road transport alone in Europe to be at between €67 billion to €80 billion[2]. Further to this, air pollution also contributes to irreversible damage to ecosystems and biodiversity, as well as degradation of buildings and monuments in cities.

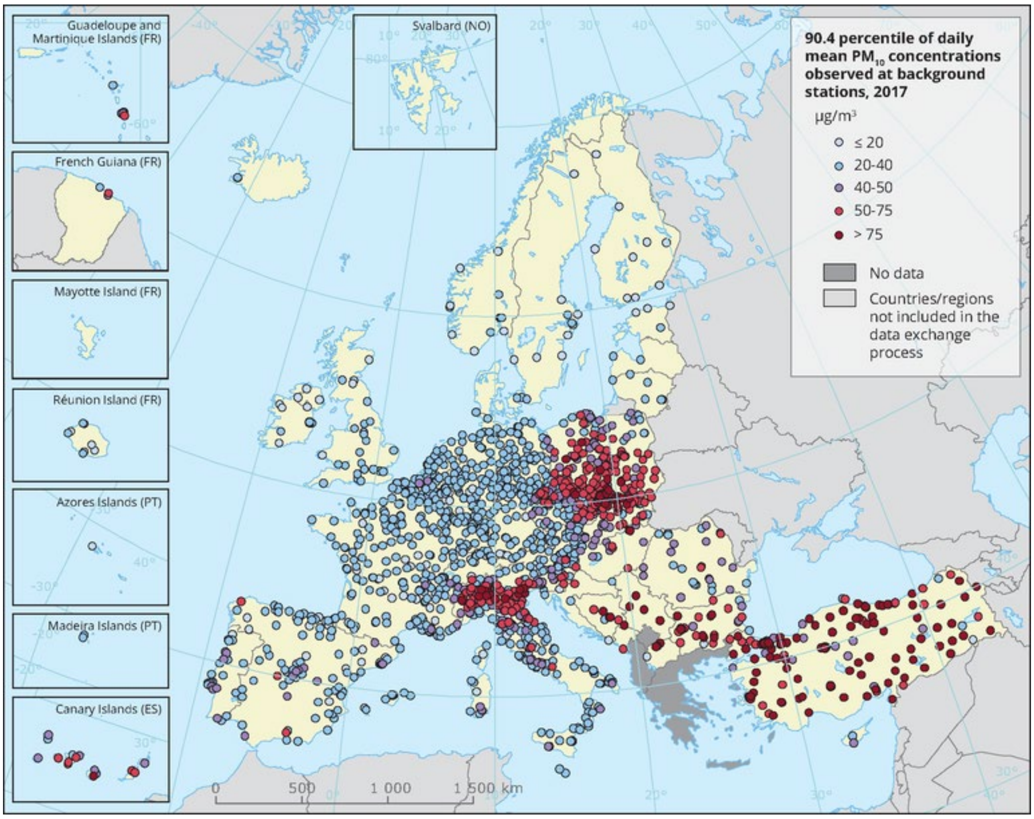

Figure 1. Percentile of daily PM concentrations across Europe. Source: European Environment Agency (2017)

This chapter will provide an overview of remote sensing devices and the role they play in improving air quality, as well as current policy options in the EU at wide and in specific localities / applications.

2.1 Remote Sensing Devices: emissions

2.1.1 Real World Driving Emissions

Remote Sensing Devices (RSD) are a key technology that is able to measure the Real-World Driving Emissions of individual motor vehicles (e.g. motorcycles, cars, trucks). The device, like the one being developed in the NEMO project, requires no detectable physical, mechanical or electronic connection to the vehicle itself and is able to analyse emissions from vehicles as they pass by occurring during every day travel.

The Real Driving Emissions (RDE) are the emissions emitted by the vehicles in real driving conditions, in the real world. Specifically, this type of emission testing enables an accurate screening of vehicles on an

[1] https://www.eea.europa.eu/publications/air-quality-in-europe-2020-report
[2] https://epha.org/how-much-is-air-pollution-costing-our-health/

individual basis as they are on the road. The purpose of such test is to measure vehicle emissions from exhaust systems beyond a laboratory environment, as it is currently done for laboratory testing, but also in situations where a car is exposed to a wide range of conditions such as speed, payload, driving behaviour and so on. RDE tests ultimately ensure that vehicles deliver the emissions promised on paper also on the road.

Crucially, it was the 2015 Dieselgate scandal which brought to the attention of policymakers and the wider public concrete evidence of a gap between real world vehicle emissions and those detected under vehicle compliance tests, as further explained in section XX.

2.1.2 In-service conformity

Remote Sensing Devices can also be used to successfully and accurately measure the real- world emissions of in-use vehicles.

Historically, in-use compliance testing of certified vehicles has been done relying on laboratory-based dynamometer emissions tests on recruited in-use vehicles of each certified model. However, following the 1998 scandal involving heavy duty vehicles (HDVs), another technology was introduced for trucks specifically: Portable Emissions Monitoring Systems (PEMS). This technology enables real world emissions to be measured directly by on-board analysers and was introduced to supplement (and not substitute) traditional laboratory dynamometer testing. Crucially, state investigations have revealed huge differences between laboratory test emissions and on-road emissions from the same vehicles[3].

Laboratory testing and PEMS testing to be done however require either an unusual mode of operation of the vehicle or mechanical/electronic connections to be installed. This is problematic as the testing can be defeated easily. Further, this type of testing is expensive and lengthy and can therefore be conducted only on a handful of selected vehicles per type each year. This ultimately limits an adequate screening of the entire vehicle fleet.

Figure 2 below for example shows an exercise done in China[4] by the International Council on Clean Transportation (ICCT) of laboratory and on-road testing of exhaust emissions of China 5 light-duty gasoline vehicles. What the testing show is that there is a significant and worrying gap between what the laboratory tests detect, and what the RDE tests detect.

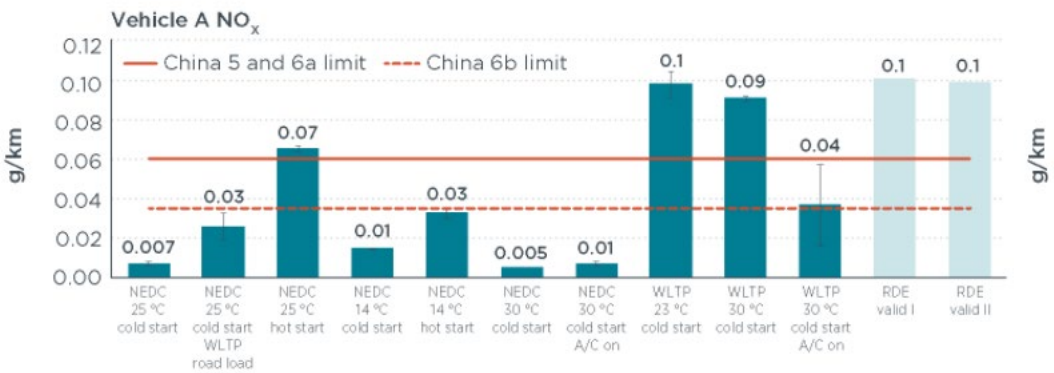

Figure 2. Difference between laboratory and on-road testing on vehicles in China. Source: ICCT (2018)

[3] https://www.eea.europa.eu/publications/co2-emissions-new-cars-and-vans-2016
[4] https://theicct.org/publications/lab_onroad_testing_emissions_China5_LDV

2.2 Policy overview

2.2.1 European Union framework

Following the 2015 Dieselgate scandal, in 2017 policymakers introduced new laboratory tests for emissions as well as real driving emissions tests on the road[5]. The new laboratory tests, called Worldwide Harmonized Light Vehicle Test Procedure (WLTP), were introduced with the objective of gradually replacing the New European Driving Cycle (NEDC). In addition to WLTP, the new rules also put in place Real Driving Emissions testing which measure emissions such as nitrogen oxides (NOx) and number of particles (PN) in real traffic and environmental conditions. In short, while WLTP is a dynamometer test, RDE is a measurement method under real driving conditions.

In supplementing Regulation (EC) No 715/2007 on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles and on access to vehicle repair and maintenance information with Regulation (EU) 2017/1151, the European Parliament and the European Commission both recognised the added value of RDS technology, specifically mentioning the importance of calculating real driving emissions. Whilst the regulation has come into force however, gaps to be addressed still remain.

Upcoming regulations on air quality includes the revision of Euro emissions standards, namely to develop emissions standards (Euro 7) for all petrol and diesel cars, vans, lorries and buses which is expected for later this year and which will tackle specific pollutants.

At a wider EU level, the European Commission launched its Zero Pollution Action Plan[6] which has a 2030 target of improving air quality to reduce the number of premature deaths caused by air pollution by 55% compared to 1990 levels.

2.2.2 Implementation in cities and at national level

Key countries and cities across the EU are increasingly adopting RSD to support them in identifying high emitters from road transport on the roads, as well as helping with the implementation of Low Emissions Zones.

In Madrid for example, and thanks to the EU-funded project LIFE GySTRA, the City Council found that a that a small percentage of the city's fleet was responsible for a significant share of total emissions from on-road vehicles. For this reason, the City Council has recently published a new Air Quality Law[7]. The law specifically obligates high-emitting vehicles that are identified on the road via technologies such as RSDs to be sent by the authorities to undergo an extraordinary inspection of the emitting vehicle itself, thereby preventing circulation. The owner of the vehicle will have 30 calendar days to take the vehicle to an inspection centre.

Authorities, if they deem it fit, will also be able to – as a temporary measure – to ask for the vehicle to be removed from the road in case the emitting fumes impair visibility to other road users. The owner will be able to take the vehicle back only upon having shown a document stating that they will repair the vehicle itself and only after having passed the inspection; any movement until then must be done

[5] https://ec.europa.eu/commission/presscorner/detail/en/IP_17_2822
[6] https://ec.europa.eu/environment/strategy/zero-pollution-action-plan_en
[7]https://www.madrid.es/portales/munimadrid/es/Inicio/Medio-ambiente/Ordenanza-de-Calidad-del-aire-y-Sostenibilidad/?vgnextfmt=default&vgnextoid=7be9e2e7a00e5710VgnVCM2000001f4a900aRCRD&vgnextchannel=3edd31d3b28fe410VgnVCM1000000b205a0aRCRD

through a trailer. Madrid City Council also put in place fines for those that do not comply, starting from 750€ and up to 3000 €.

Remote Sensing Devices in this context have the ability to support local authorities in accurately identifying high emitters.

Looking into growing Low Emissions Zones across Europe[8], RSDs have a key role in supporting the implementation of these areas. As explored in a different EU-funded project implemented in Madrid for example [9], remote sensing technology can effectively reinforce and insure an adequate implementation of Low Emissions Zones. According to data collected in the project in fact, Madrid's LEZ environmental labels assigned to cars are a good first step in categorizing vehicles however these labels may not accurately reflect the real-world emissions of cars entering the city. The RSD device can ultimately ensure adequate compliance in line with the steps outlined above for instance.

Focusing on heavy duty vehicles, a recent study conducted by Transport & Environment[10] using remote sensing technology found that nearly a third of trucks in Spain exceed the EU's legal emission limits. What the testing rolled out in Madrid and Barcelona showed is that 29% of the 587 light and heavy trucks measured were high NOx emitters. What the report highlighted is that official laboratory tests at present are inadequate as, given time constraints, they often do not account for emissions produced under everyday driving conditions, such as low-speed driving and cold-starts (emissions from when the engine is first turned on). Crucially, these tests also fail to ensure so-called emissions durability, causing some models to emit more over time. Thirdly, the tests also fail to prevent tampering where emissions reduction systems are switched off by what is known as defeat devices, a practice that is common in heavy-duty vehicles. To bridge this gap, Remote Sensing Devices can play a key role in making sure that independent emission compliance testing of RDE takes place, ultimately allowing for all trucks to respect the emission limits under all driving conditions throughout their entire lifetime.

3 Current landscape: Noise

Noise pollution, which is often less in the spotlight compared to air quality issues, causes a disease burden resulting in over 1.6 million healthy years of life lost every year[11]. In Europe alone, at least 113 million citizens are exposed to harmful traffic-related noise above 55dB Lden[12], which costs the EU an estimated €57.1 billion each year[13]. In addition to this, 22 million people to harmful railway noise, 4 million to aircraft and almost 1 million to industrial noise.

[8] https://ecf.com/news-and-events/news/low-emission-zones-european-success-story
[9] https://lifegystra.eu/en/remote-sensing-to-upgrade-european-low-emissions-zones-such-as-madrid-central/

[10] https://www.transportenvironment.org/wp-content/uploads/2021/09/RS-briefing-high-emitters-review-copy.docx.pdf
[11] http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
[12] EU indicator that corresponds to the average noise level throughout the day, evening and night.
[13] Adding together road passenger and road freight costs, p.98: CE Delft Handbook on External Costs of Transport 2019; https://www.cedelft.eu/en/publications/download/2750

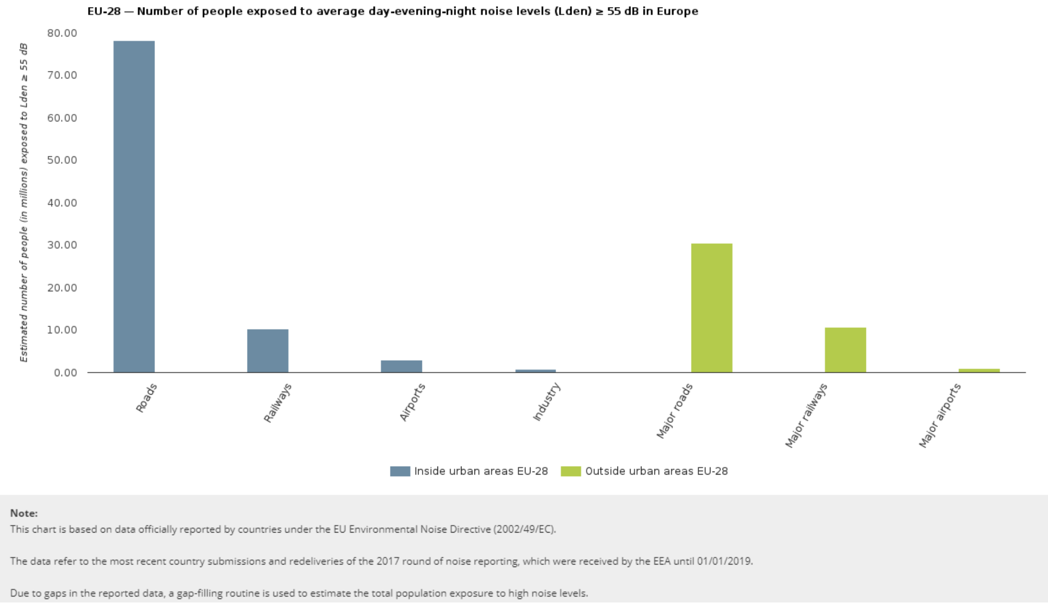

Figure 3. Number of people exposed to noise pollution in the EU. Source: European Environment Agency (2019).

3.1 Devices measuring noise

Remote sensing systems to measure noise emission from road and rail vehicles are also technologies under development. Specifically, these devices are able to identify individual road vehicle's or train wagons noise emissions within a traffic stream, without – similarly to RSD for emissions – interrupting the traffic flow. Besides the real time monitoring of individual vehicles, the system will be able to separate if the noise origin from engine acceleration or tyre-road-interaction.

The noise caused by a vehicle can have different origins such as poor vehicle condition, intentional noise-increasing modifications (tampering), or certain driving behavior such as high accelerations. For rail, wagons fitted with cast iron block brakes can be especially noisy.

In practice, the technology to measure noise emissions consists of several microphones (microphone array) to detect specific sound sources with the ability also to detect the exact position of the source, thereby removing other background noises that may occur (e.g. a different vehicle). The data collected is then fed into a classification model, to determine whether the passing vehicle is a high-emitter or not.

3.2 Current policy

The EU's overall noise reduction objectives however are regulated by the Environmental Noise Directive (END) (EU, 2002)[14], which provides the primary legislative framework for achieving noise reduction. One of the aims of END is to offer a common approach to avoiding and preventing exposure to environmental noise through the reporting of noise mapping and action planning, thereby reducing its harmful effects and preserving quiet areas. Crucially, it is important to note that the directive does not set limit values but instead it sets reporting thresholds. Specifically, under this directive Member States are required to:

[14] https://ec.europa.eu/environment/noise/directive_en.htm

- Produce strategic noise maps on a 5-year basis for all major roads, railways, airports and urban agglomerations, using harmonised noise indicators. Applicable to the NEMO project, this covers roads with over 3 million vehicle passages per year and railways with more than 30 000 train passages per year.
- Determine the number of people exposed to each of the above noise sources, inside and outside urban areas, as well as large industrial installations inside urban areas using 5 dB interval bands at Lden ≥ 55 dB and at Lnight ≥ 50 dB.
- Adopt action plans based on noise mapping results, with a view to preventing and reducing environmental noise, in particular in areas where exposure levels can induce harmful effects on human health.
- Select and preserve areas of good acoustic environmental quality, referred to as 'quiet areas', to protect the European soundscape.

Accompanying the END, there are a number of specific legislative measures that aim to address or control noise at the source such as by imposing noise limits on certain vehicles or equipment, including their constituting components, or by restricting their operation. In the context of road and rail transport, key ones are outlined below.

Road transport

- Directive 97/24/EC on certain components and characteristics of two- or three-wheel motor vehicles
- Directive 2001/43/EC amending Council Directive 92/23/EEC relating to tyres for motor vehicles and their trailers and to their fitting
- Regulation (EC) No 661/2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units
- Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefore
- Regulation (EC) No 1222/2009 of the European Parliament and of the Council of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters
- Regulation (EU) 168/2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles
- Regulation (EU) 540/2014 on the sound level of motor vehicles and of replacement silencing systems, and amending Directive 2007/46/EC and repealing Directive 70/157/EEC

Railways

- Commission Decision 2002/735/EC concerning the technical specification for interoperability relating to the rolling stock subsystem of the trans-European high-speed rail system referred to in Article 6(1) of Directive 96/48/EC
- Commission Decision 2002/732/EC relating to technical specification for interoperability relating to high speed railway infrastructures
- Directive 2008/57/EC on the interoperability of the rail system within the Community
- COM(2008)432 Communication from the Commission to the European Parliament and the Council — Rail noise abatement measures addressing the existing fleet (rail)
- Commission Decision 2011/229/EU of concerning the technical specifications of interoperability relating to the subsystem 'rolling stock-noise' of the trans-European conventional rail system

Crucially, in the context of road transport for example and similarly to emissions testing, the noise levels are checked periodically through periodical technical inspections, as opposed to real driving conditions and behaviours. Another key problem for example, is that nor the EU nor the United Nations Economic Commission for Europe (UNECE) regulate noise at peaks, but instead only at low speed.

In the context of rail it is important to know that it cannot be regulated at a local level but instead at a EU and national one. The only say a local community can have is during the planning stages of a project, during which the limits for their areas are set[15]. Equally, the emissions of a train are again set at EU level as outlined above in the legislative overview, therefore member states do not have a say on the Technical Specifications for Interoperability. For example, in Germany a Traffic Noise Protection Ordinance[16] aims at regulating high-emitters for rail: this specific legislation allows to measure trains that pass-by inhabited areas and, when a high-emitter is identified, it receives a warning to be sent to a repair station but little more action takes place.

A study conducted by Ricardo comparing noise legislation in rail and looking into the cases of Germany and the Netherlands specifically (table below)[17], found that there is ultimately a fragmented picture across the EU with difficult enforcement at a local level and discontent with residents, as the measured emissions go over legally required limits and technical feasibilities without further investments.

Aspect	Germany	Netherlands	Comments
Rolling Stock (Emission):			
TSI Limits	x	x	
Stricter national limits than TSI		x	Attempted; but since waived as unattainable
Criterion for admittance (acceptance)	x	x	Access to rail
Incentive for improvements	x	x	Mostly targeted at freight
Receivers (Immission):			
High speed rail specific			Source-independent limits
EU limits	x	x	European Noise Directive
Noise maps & action plans	x	x	Required updates every 5 years
Compliance check yearly		x	
New or altered infrastructure	x	x	
Existing infrastructure		x	Germany: only voluntary measure if limit exceeded
Enforcement by infrastructure manager		x	
Enforcement by government	x		

[15] http://www.docutren.com/pdf/boletin/[IIIB%201968].pdf
[16] https://www.gesetze-im-internet.de/bimschv_16/anlage_2.html
[17] http://www.docutren.com/pdf/boletin/[IIIB%201968].pdf

4 Methodology for charging and access

4.1 City access schemes

Although the new trends in sustainable mobility have an impact on the promotion of electric vehicles, their actual implementation in Europe is not as quick as desired and, moreover, it is very variable from country to country[18]. Further, a recent report[19] from the ICCT showed that the urban areas with the highest number of deaths related to transport air pollution per 100,000 residents are European. The top 10 in 2015 were Milan, Turin, Stuttgart, Kiev, Cologne, Haarlem, Berlin, Rotterdam, London, and Leeds.

Pay per use or pay per access schemes already exist in different parts of the world. Low Emission Zones are also solutions that seek to restrict traffic into the city centres, or at least avoid the worst polluters in doing so. However, many of these models are based on "environmental labels" or just the age of the vehicle. The access to urban areas can be and should be done smarter, decreasing the externalities caused to the population and allowing the creation of green and fairer taxation models: the polluters-pay principle.

This objective can be addressed through the implementation of pricing systems for access to cities, with multiple alternatives. For example, access fees could be designed with variable and dynamic prices for all vehicles (depending on multiple factors, such as their actual emissions, passenger occupancy and level of congestion in the city).

Such pricing could be based on four main externalities:

The occupancy of the infrastructure: if there are traffic jams or the traffic intensity is too high, the access price should be higher. This would discourage everyone from entering the city at the same time, causing traffic jams, which leads to a significant increase in emissions and noise. Ideally, streets and roads should never be overcrowded.

The occupancy of each vehicle: A good solution to reduce emissions is to have fewer vehicles per citizen accessing the city. Public transport is ideal for this, as its emissions per passenger are the lowest. But in addition, the private vehicle tends to be occupied by one or two people. Increasing the occupancy rate of each vehicle (e.g. by car sharing) would reduce pollution enormously. There are passenger counting cameras that could be used for this purpose. If a vehicle is only occupied by one person, the fee for entering the city should be higher. This solution already exists in some places in the world and also in Europe.

The actual pollution emitted by the vehicle: Depending on the emitting profile of the vehicle, the access rate to the city should be different. For example, if the vehicle is electric, the rate would be zero, but if it is highly polluting, the rate would be maximum. In the case of large emitters, access could be denied directly to the city.

The pricing logic and the access scheme should be flexible and designed by each local administration.

[18] https://www.eea.europa.eu/data-and-maps/daviz/new-electric-vehicles-by-country-3#tab-dashboard-01
[19] https://www.transportenvironment.org/discover/cities-where-chances-dying-transport-pollution-are-highest-are-all-europe/

4.2 The Polluter-pays Principle

The polluter-pays principle, laid down in Article 191 of the Treaty for the European Union[20], stipulates that the cost of preventing, reducing or repairing environmental impairment should be borne by the polluter and not by the taxpayer. Applying this principle to road traffic, it would considerably burden vehicle manufacturers, fuel producer or vehicle users - whoever is considered to be the "polluter" - as they would have to pay for the damage. Such a policy does not appear to be politically feasible and is not pursued by EU - or, indeed, by any other country or part of the world.

As not every vehicle pollutes the same and there are very few individual vehicles (high-emitters) with significantly higher emissions (compared to other analogous models) the access schemes could focus on these vehicles when implementing city-access schemes.

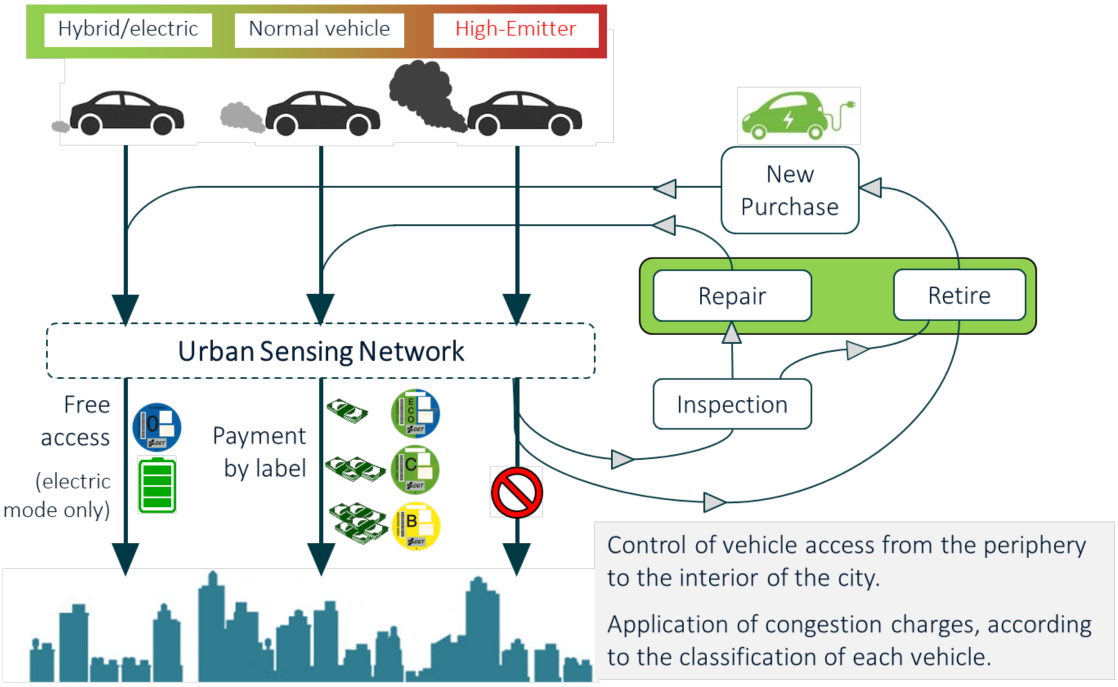

Figure 4. Remote sensing based polluter-pay scheme

A remote sensing network would be monitoring the vehicles' emissions across all the metropolitan area, grouping vehicles in different groups. We propose:

- **Low emitters**: these vehicles would be zero emission vehicles (battery electric vehicles or fuel cell battery electric vehicles) or plug-in hybrid electric vehicles only if used in electric-only mode.
- **Normal emitters**: these vehicles would internal combustion engine vehicles (diesel or petrol).
- **High emitters:** these vehicles would be as the category above, but high-emitting vehicles specifically.

20 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12012E/TXT&from=EN#page86

The most critical point is therefore to regulate the last group, the high-emitters one. In general, high-emitters should be prevented from entering into the city or, at a minimum, a city's Low Emission Zone, independently if the vehicle was allowed to access the area ahead of its identification.

Notice that the measurement should not be done precisely at the access point and time. A vehicle is identified as a high-emitter, then the vehicle owner is notified, then the user has the possibility of repairing/correcting the vehicle. This would provide legal coverage to implement this kind of access schemes.

However, it is yet important to clearly define if the vehicle is a high emitter because it has been tampered with, because there is a mechanical fault (and if so, does the warranty cover it) or because it is a design issue from the vehicle manufacturer.

4.2.1 Polluter-pays principle in Noise

Similarly to the what outlined above in the case of air pollution, an equivalent approach could be applied in the domain of noise emissions.

Cities and urban areas would have to identify specific access areas or streets where detection of high emitters in the context of noise could happen. For example, in Germany some residential areas are limiting the speed of vehicles to avoid noise related annoyance. The causes linked to the noise could be (non-exhaustive list):

- System malfunction
- Tampering of vehicle
- Driving behaviour

The city authority would therefore have to establish a cause and effect relationship per each criterion, with related fining principle if applicable.

In the first instance – vehicle malfunction, as it is for gaseous emissions, it must be established if the cause of the malfunction can be traced back to the vehicle manufacturer itself and if the noise level is exceeding type approval levels. In the second instance, tampering of vehicle, specific action should be undertaken with the police. In the third listed instance, driving behaviour, a limitation on vehicle speed limit could be a solution to prevent the issue with a fine-based system linked to both speed and noise.

The issue however remains on what can be defined as a high-emitting vehicles and how can cities also tackle the issue of recreational vehicles and special category vehicles which, under EU legislation, have exceptions to type approval limits. The WhitePaper on cities implementation will further explore this.

4.3 Implementation

As outlined in a previous NEMO report[21] on creating a methodology for external costs estimations, several factors need to be taken into consideration when developing an adequate methodology, namely utilising a COPERT[22] emission model with some additional inputs such as insuring that emissions are representative of single vehicles (in order to best address high emitters) and that the emissions are not spatially allocated for instance.

Cities should also strive to pull together a database outlining the profile of the vehicles, which models and brand are the vehicles, and an adequate follow up of the issue (what was the cause) and its

[21] https://nemo-cities.eu/wp-content/uploads/2021/10/NEMO_Deliverable_D8.1_Methodology-for-external-cost-estimations_final.pdf
[22] https://www.emisia.com/utilities/copert/

resolution. This database would also be helpful for Market Surveillance Authorities in identifying a potential trend across certain vehicle categories or repeated issues, such as recently seen for heavy duty vehicles on Spanish roads[23].

Further, effective use of remote sensing technology has also been demonstrated wen used by roadside police inspections as a tool for identifying and stopping tampered trucks, where the emission control system has been disabled and emitting large amounts of air pollution. This, coupled with a database and an effective use of portable emissions measurement systems can help in developing a harmonised remote sensing procedure and publicly accessible cross-border database across the EU with a clear remote sensing procedure. This would allow the European Commission, Member States and cities to monitor the EU's vehicle fleet emissions on a real-time and regular basis and help identifying high-emitting vehicles for further testing and investigation

5 Conclusions

This report provides an overview of current policy options in the EU related to remote sensing devices both for air quality and noise. The report concludes there is a fragmented policy landscape for both air quality and noise real world emissions across the EU, as it has been demonstrated that the emissions in the real world do not match laboratory ones.

The report further looks into the issue of charging and access of vehicles – across different categories – in cities and how should local governments implement solutions to reduce emissions and ultimately identify high-emitters on their roads.

The NEMO project should provide clear policy recommendations in this field where there is potential for remote sensing devices to address issues related to real world emissions.

[23] https://www.transportenvironment.org/discover/almost-a-third-of-trucks-tested-emit-dangerous-levels-of-air-pollution/