

# THE INFLUENCE OF THE CAR FLEET ON AIR QUALITY

Assoc. prof. Adrian LEOPA, PhD.  
"Dunarea de Jos" University of Galati,  
Research Center for Mechanics of Machines  
and Technological Equipments

## ABSTRACT

*The present work highlighted the influence of road traffic on the concentration of particulate matter in an area of Braila municipality. For this work, an area in the municipality of Braila was chosen which included both a street with heavy road traffic and a residential complex of houses with moderate road traffic.*

KEYWORDS: bridge, seismic excitation, coefficient of friction, PTFE

## 1. INTRODUCTION

Currently, one of the problems of urbanization is air pollution, which has as its main factor the road traffic. After the invention of the steam engine, which is the reference point of the industrial revolution, technical progress has experienced a great momentum so that at present we cannot imagine life without certain inventions, such as, for example: cars. The car has opened new horizons, allowing people to travel faster, over longer distances and build things they had only dreamed of before.

## 2. ASPECTS CONCERNING THE SITUATION OF THE CAR PARK

The statistical data presented below refer to the situation in Romania and Braila County.

Based on the statistical data provided by the General Directorate for Driving Licenses and Registrations in Romania, regarding the category "Cars", the following assessments can be made:

- At the end of 2007, the number of cars registered in Romania that operated on gasoline and diesel fuel was 3.54 million, this number reaches 7.47 million at the end of 2021, an increase of 211%;
- the situation is similar for Braila

County: if in 2007 the number of the same category of vehicles was 41983, in 2021 their number reached 97554, therefore an increase of 232%;

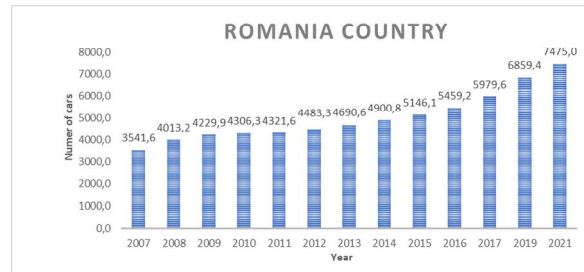


Fig. 1 Evolution of the number of petrol and diesel cars in Romania

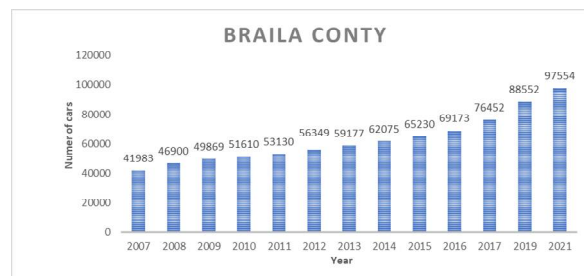


Fig. 2 The evolution of the number of petrol and diesel cars in Braila County

- Against the background of the increase in the number of cars, both at the national level and at the level of Braila County, it is of interest to also analyze the evolution of the number of cars

depending on the type of fuel and according to their age.

- From the evolution of the number of cars at the national level, depending on the fuel used (diesel / gasoline), shown in fig. 3, 4 it is obvious that the situation in 2007, was reversed at the end of 2021, so that cars that use diesel as fuel exceeded in number those running on gasoline. Both types of engines (diesel and petrol) are polluting even if there are sensitive differences between them from this point of view.

- Both types of engines (diesel and petrol) are polluting even if there are sensitive differences between them from this point of view. However, in view of the traffic restrictions imposed on cars equipped with diesel engines in certain European capitals and the tendency of large car manufacturers to reduce the production of diesel cars, we can conclude that diesel engines are more polluting than petrol engines.

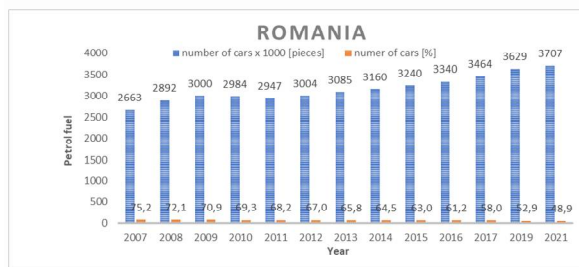


Fig. 3 Evolution of the number of petrol cars at national level

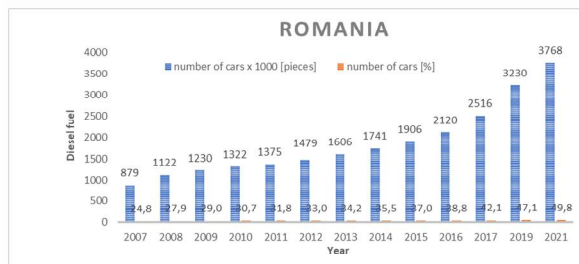


Fig. 4 Evolution in the number of diesel cars at national level

- A similar situation to the one at national level is also found at the level of Braila County, so that, compared to 2007, when gasoline cars represented 82% of the total, in 2021 they represented only 57.8%, fig. 5,6.

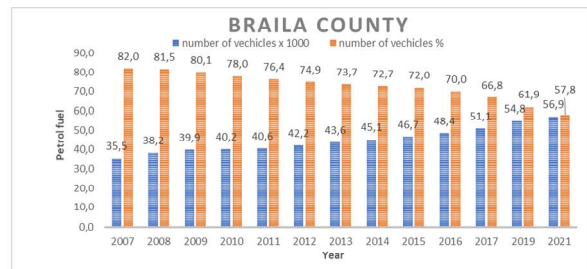


Fig. 5 Evolution of the number of petrol cars at Braila County level

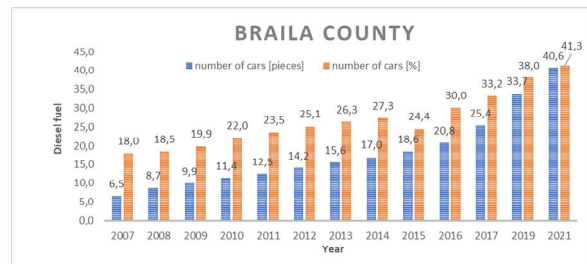


Fig. 6 Evolution of the number of diesel cars at Braila County level

An aspect as important as the one analyzed previously is the age of the car park in Romania. For this analysis, based on the information taken from the General Directorate for Driving Licenses and Registrations in Romania, the 20-year reference age was chosen.

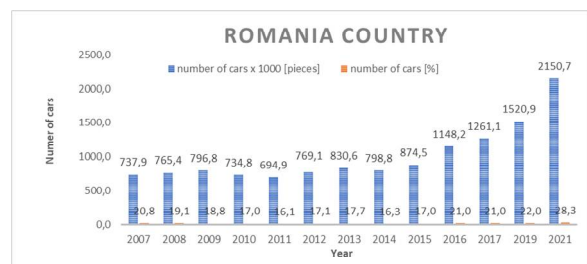


Fig. 7 Number of cars older than 20 years at national level

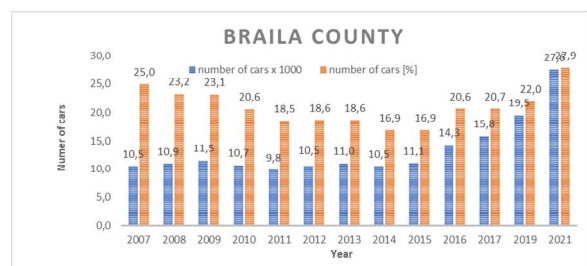


Fig. 8 Number of cars older than 20 years at Braila County level

From fig. 7, 8 it is observed with concern that the segment of cars more than 20 years old is growing. In recent years, hybrid and electric cars have appeared in Romania's car park, which, apparently, represents a pleasing aspect from the point of view of environmental pollution. The increase in the number of cars in

this segment has seen a recovery following the cancellation of the environmental stamp duty for cars, starting with 01.01.2017.

Ministry of Environment makes available to the population the data regarding the air quality through the web page: calitateaer.ro, fig. 9. Through this web page can be consulted a series of air quality parameters in different areas of the country, as follows: SO<sub>2</sub>, NO<sub>x</sub>, CO, Pb, PM<sub>10</sub> and PM<sub>2.5</sub>, Benzene, Toluene, o,m,p – Xylene, Ethylbenzene.

### 3. ON THE STATE OF AIR QUALITY IN BRAILA

At Romanian level, the National Environmental Protection Agency within the

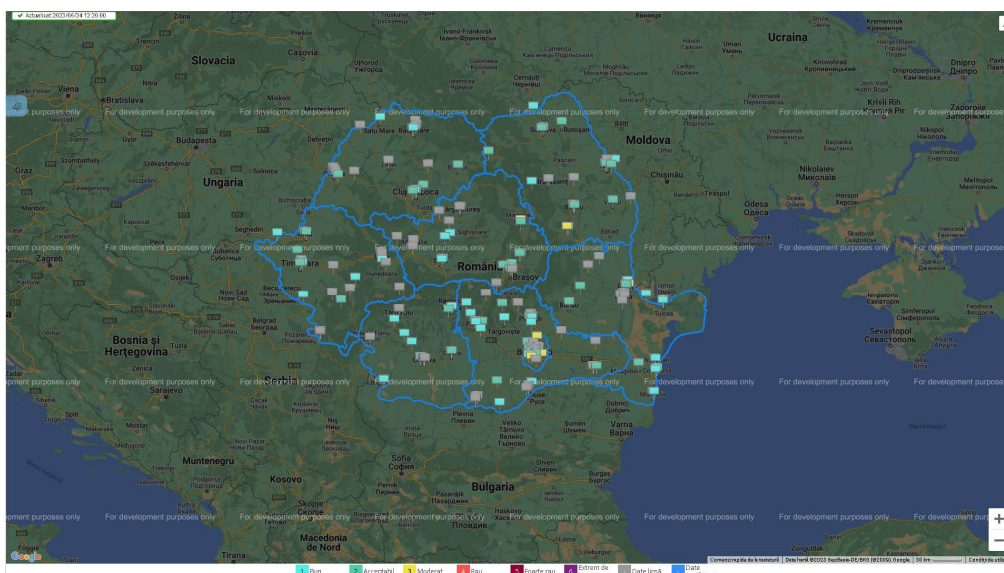


Fig. 9 National air quality monitoring network

Air quality in Braila is monitored through the fixed stations. Based on the data provided by the Ministry of Environment, time variations for the following parameters are presented for Braila: nitrogen oxides, PM<sub>10</sub> determined by gravimetric method and PM<sub>10</sub> determined with the UNITEC device model LSPM10, fig. 10, 11, 12.

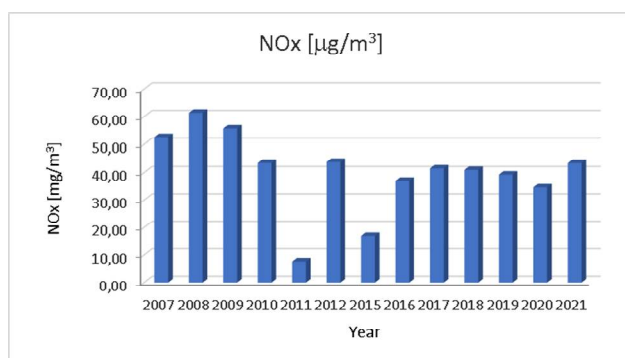


Fig. 10 Variation of air quality parameters for Braila – NOx

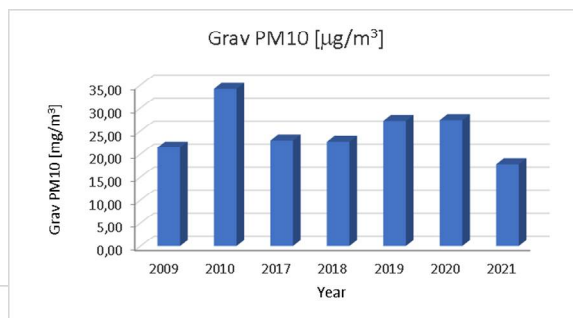


Fig. 11 Variation of air quality parameters for Braila – grav. PM10

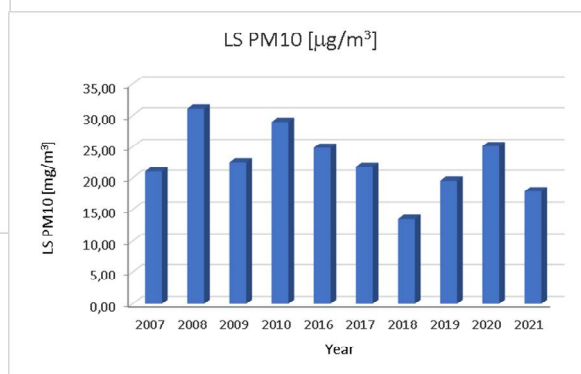


Fig. 12 Variation of air quality parameters for Braila – LS PM10

The NO<sub>x</sub> variation in Braila can be correlated with the evolution of the number of diesel cars, but also with the number of cars older than 20 years, as follows: with the increase in the number of vehicles in both categories, starting with 2015, the NO<sub>x</sub> concentration increases until 2020, after which it decreases. Market entry of hybrid and electric vehicles may constitute a decrease in NO<sub>x</sub> concentration levels.

The PM<sub>10</sub> concentration evolves similarly to NO<sub>x</sub>, in other words, since 2017 the PM<sub>10</sub> concentration has continuously increased until 2020, followed by a decrease in 2021.

#### 4. CONCLUSION

In Romania, it has been found that in recent years the number of cars older than 20 years has steadily increased, which is a reason for concern for the state of the environment. This reason is supported by the fact that cars older than 20 years are equipped with catalyts, not low pollution norm. The Euro 3 pollution

standard became mandatory from 200/2001, so these cars are equipped with catalyts with a lower pollution standard than this. Reducing imports of old cars in Romania can be done by reimposing a pollution tax for this category.

The rise in diesel cars is also a cause for concern in terms of air pollution.

In conditions of intense air pollution from road traffic, urban planning measures are required to reduce it, as follows:

- ✓ synchronization of traffic lights located on the same street increasing green areas
- ✓ imposing a pollution tax depending on the pollution norm of the car and its technical condition
- ✓ roadside checks on the technical condition of cars.

#### REFERENCES

- [1] <https://dgpci.mai.gov.ro/news-and-media/statistica>
- [2] <http://www.anpm.ro>
- [3] <https://www.calitateaer.ro/>
- [4] <http://apmbr.anpm.ro>