

# CO<sub>2</sub> emissions from road transport and impact on climate changes

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## Abstract

The paper examines CO<sub>2</sub> emissions from road transport released into the air. For the experiment were used road vehicle traveling along a predetermined path from a starting point to end point. During the vehicle journeys were recording the required data, which indicate CO<sub>2</sub> emissions from road transport.

*Keywords:* vehicle, road, emission CO<sub>2</sub>, load, fuel consumption

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## 1. Introduction

The article describes an experiment in which investigated of CO<sub>2</sub> emissions from road transport. For the experiment were used vehicle on which were made to 3 drive for 3 types of loads, namely for the full, half and without load. All drive were made on the same route Prague-Kladno and back. For vehicle load was used (cast-iron wheeled weights for tractor), one weights weighed 43 kg. Full load was used 10 weight of the total weight of 430 kg. For half load 5 weight on total weight of 215 kg. The third drive was performed without load.

The aim of the article is to demonstrate through practical measurements on a road vehicle, production CO<sub>2</sub> emissions with respect to other influences.

## 2. Experiment - determining the frequency of emissions CO<sub>2</sub>

The aim of this experiment was to measure the actual emissions - CO<sub>2</sub> in operation, using the methods of OBD (On-Board Diagnostics) to measure pollutants. The method used to diagnose OBD emission systems in vehicles. On-board diagnostic (OBD) systems are important to control emissions during vehicle operation. Given the importance of controlling real world emissions, the Commission should regularly review the requirements for such systems and the tolerance thresholds for monitoring faults. Method OBD records the values obtained during the driving of the vehicle onboard diagnostics. The aim of the measurements are complete evaluation of emissions - CO<sub>2</sub> while driving a Skoda Roomster, which is used as a family car or small business use it as a small truck. In this case, the car is considered as a small truck that is used to transport and import of goods and materials.

Test method using OBD was made for driving 3 types of load: 1) full, 2) half, 3) without load.

Before the measurements took place settings and preparation of monitoring vehicle position using GPS (Global Positioning System), the installation of cameras MIO on the windscreen, as

well as preparation of OBD (On-Board Diagnostics) cable - USB, which was connected to the control unit of the car with a laptop.

For reading data from the engine control unit was used on-board diagnostics VAG-COM using the software VCDS. After the ignition has been loaded software control unit. For all three types of loads were carried away from Prague 6 - Suchdol in Poldi Kladno, Dubská street and back. All three runs were conducted along the same route. At full load it in the truck of the vehicle load of 430 kg. At half load was in the cargo compartment of the vehicle 215 kg. And when driving without a load in the cargo hold was 0 kg. For loads were used cast iron wheel weights for tractor disc-shaped. Wherein one block weighed 43 kg.[3]

While driving, the following parameters were recorded: time [s], the vehicle speed [km / h], the amount of fuel consumed in time Dt [ml] distance [km]. Fuel consumption, which was measured in microliters, was then converted to liters and is used to calculate CO<sub>2</sub> emissions.[1][4]

## 3. Experimental line and load specifications

Further disclosed is the route on which the experiment was conducted.

The figure shows a marked route from Prague 6 - Suchol to Poldi Kladno, Dubská street.

For all types of rides on the Prague - Kladno, and it went back over the route shown on the map.

Rides were made in the rush hour. When driving, went to various classes of roads where there are different limits permitted speed limits. During the ride, also stood in the column due to the frequency of cars on the road at any given time and repairs on the roads in those sections. [2]

The figure shows a map with the route Prague – Kladno

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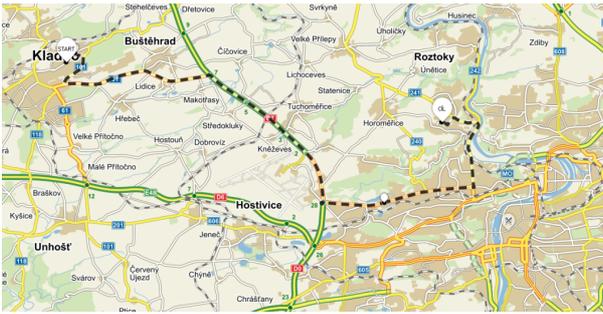


Fig.1 Praha – Kladno

Figure 1 shows the route from Poldi Kladno Dubská street in Prague 6 - Suchbát. Thus, the map shows the way back from Kladno to Prague. However, measurements always started in Prague 6 - Suchbát where the commuted Kladno direction and then back again in Prague 6 - Suchbát. Direction back and forth it went always along the same route.



Fig. 2 Cast iron weights wheeled tractor 10 pieces 1 piece has a weight of 43 kg.

Figure 2 shows the 10 pieces of iron weighing wheeled tractor, which in this case served as a loading vehicle. 1 piece weight weighs 43 kg. At a load of 10 pieces of weights, the automobile was loaded with 430 kg in the cargo space. The maximum load was also evident from the outside view of the sagging body, which is about 10 cm closer to the rear axle.

#### 4.Measurement-specification

For the measurement, a car Roomster 1,2 TSI 63 kW. This vehicle was used the following measurement techniques: [x4] GPS (Global Positioning System) camera MIO, OBD (On-Board Diagnostics) cable - USB, notebook, on-board diagnostics VAG-COM, the software VCDS [4]

#### 5. Results

##### Full load : Route Kladno – Praha

For illustration were shown graphs for example for a full load. Fig. 3 shown dependence of vehicle speed and fuel consumption on time.

Fig.4 describes dependence of the vehicle speed and rate of CO<sub>2</sub> emissions on time.

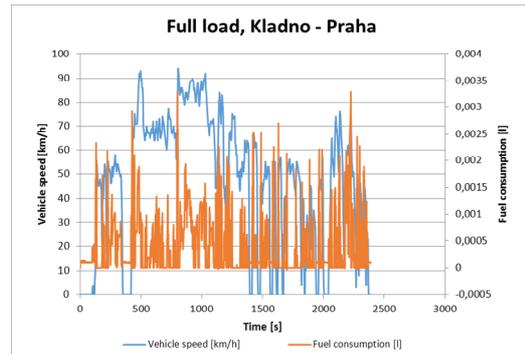


Fig.3 Full load Kladno - Praha

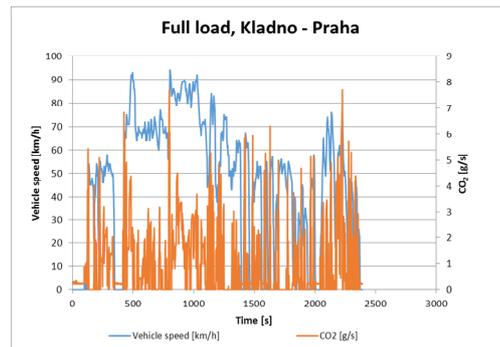


Fig. 4 Full load Kladno – Praha

The route of the vehicle was measured at 4 types of roads (motorways, I. class road, II. class road and III. class road)

##### Route: PRAHA -KLADNO

1.section	2.section	3.section	4. section	5.section	6.section
III/2404	II/241	D7	I/61(R/61)	II/118	II/101
0,8 km	7,8 km	7,3 km	8 km	3 km	3,9 km
2.60%	25.33%	23.70%	25.97%	9.74%	12.66%

Fig. 5 Route Praha - Kladno

On the return route it went in reverse order sections.

#### 6. Conclusion

The experiment used to compare the frequency of the CO<sub>2</sub> released into the atmosphere from road transport with regard to the 3 types of load and 4 types of test roads (motorways, I.class roads, II. class roads and III. class roads). Further emission rate is influenced by aspects of traffic flow. The aim is to minimize CO<sub>2</sub> emissions with respect to the global problem needs to reduce global warming the Earth in the global convention.

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