

Electric cars as a new mobility concept complying with sustainable development principles

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Abstract. Improvement of situation regarding air pollution issues and excessive road transportation dependence on crude oil is not possible any more without introducing new mobility concepts, preferably complying with the principles of sustainable social and economic development. The lack of these concepts, as emphasized in the White Paper - *Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system*, will preserve transportation dependence on crude oil so deeply that only 10% of energy will be derived from renewable sources. According to this scenario, until 2050 the CO₂ emissions in the transportation sector will increase by one third compared to 1990. Moreover, there will be an increase in the costs of traffic congestion until 2050 by ca. 50%, the difference in availability between central and peripheral areas, as well as social costs of accidents and noise pollution [1]

KEY THREATS INVOLVED IN ROAD TRANSPORTATION

Besides energy sector, for many years now the transportation has been the primary source of greenhouse gases emissions in the European Union, and in 2016 it was responsible for 27% of their emissions.

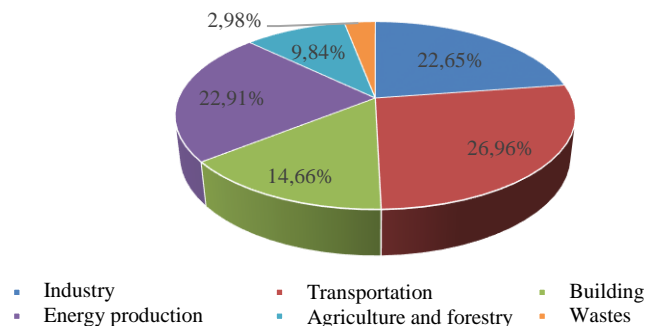


FIGURE 1. Emissions of greenhouse gases in 2016 in the EU [2]

Approximately three quarters of emission from this economic activity is generated by road transportation, and in particular passenger cars (Fig. 1).

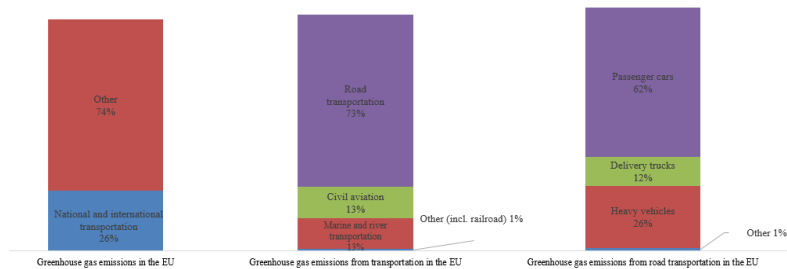


FIGURE 2. Greenhouse gas emissions in 2015 in the European Union in the transportation sector [Own study based on: 3]

In large cities the share of road transportation in total emissions of these pollutions is definitely higher and, as specified in [4], in centers it may reach even up to 90%. World Health Organization (WHO) declares that ca. 90% of residents in the European Union cities are exposed to air pollution levels considered harmful to health [5].

Moreover, road transportation is the source of particulate matter emission from abrasive wear of tires, brake disks and shoes, clutches, and secondary dust sweeping away from ground surface. Another serious issue connected with road traffic is communication noise, which becomes one of the more difficult problems regarding environmental protection [6]. According to the EU report [7], approximately 40% of residents in Europe encounter noise generated by road traffic at the level exceeding 55 decibels, while 20-30% of them are exposed to noise exceeding 65 decibels during the day and 55 decibels at night. Currently, at least 10 thousand Europeans die prematurely as a result of human body exposure to excessive noise [8], and the costs resulting from the impact of noise generated by road traffic on public health are estimated to reach 40 billion Euros per year [9].

In consideration of serious consequences of i.a. breathing polluted air and considerable acoustic nuisance encountered especially in cities, where it is necessary to solve as soon as possible the ecological problems resulting from mass transportation, there have been numerous actions implemented in the European Union for many years now in order to reduce them.

As regards suprastructure, the European Commission has pointed out that the solution for the above problems, besides improvement of the ICE-powered vehicles (by increasing their efficiency, reducing exhaust gas emission e.g. through alternative fuels including LNG, CNG, and 2nd generation biofuels), is to increase the share of alternatively driven vehicles, including those using battery only (BEV- battery electric vehicle) [11]. These vehicles have numerous advantages, and thus they are a milestone on the way to mobility complying with sustainable development principles, which will be discussed in this article.

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