

Environmental Aspects of Alternative Fuel Use for Transport with Special Focus on Compressed Natural Gas (CNG)

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Abstract : The history of gaseous fuel use in the motive power of vehicles dates back to the second half of the nineteenth century, and thus the beginnings of the automotive industry. The engines were powered by coal gas and became the prototype for internal combustion engines built so far. It can thus be considered that this construction gave rise to the automotive industry. As the socio-economic development advances, so does the number of motor vehicles. Although, due to technological progress in recent decades, the emissions generated by internal combustion engines of cars have been reduced, a sharp increase in the number of cars and the rapidly growing traffic are an important source of air pollution and a major cause of acoustic threat, in particular in large urban agglomerations. One of the solutions, in terms of reducing exhaust emissions and improving air quality, is a more extensive use of alternative fuels: CNG, LNG, electricity and hydrogen. In the case of electricity use for transport, it should be noted that the environmental outcome depends on the structure of electricity generation. The paper shows selected regulations affecting the use of alternative fuels for transport (including Directive 2014/94/EU) and its dynamics between 2000 and 2015 in Poland and selected EU countries. The paper also gives a focus on the impact of alternative fuels on the environment by comparing the volume of individual emissions (compared to the emissions from conventional fuels: petrol and diesel oil). Bearing in mind that the extent of various alternative fuel use is determined in first place by economic conditions, the article describes the price relationships between alternative and conventional fuels in Poland and selected EU countries. It is pointed out that although Poland has a wealth of experience in using methane alternative fuels for transport, one of the main barriers to their development in Poland is the extensive use of LPG. In addition, a poorly developed network of CNG stations in Poland, which does not allow easy transport, especially in the northern part of the country, is a serious problem to a further development of CNG use as fuel for transport. An interesting solution to this problem seems to be the use of home CNG filling stations: Home Refuelling Appliance (HRA, refuelling time 8-10 hours) and Home Refuelling Station (HRS, refuelling time 8-10 minutes). The team is working on HRA and HRS technologies. The article also highlights the impact of alternative fuel use on energy security by reducing reliance on imports of crude oil and petroleum products.

Keywords : alternative fuels, CNG (Compressed Natural Gas), CNG stations, LNG (Liquefied Natural Gas), NGVs (Natural Gas Vehicles), pollutant emissions

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