

8th International Workshop on Sustainable Road Freight

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Title

Infrastructure and energy management requirements for zero emission road transport vehicles at future parking lots in Hungary

Abstract

The majority of freight is currently forwarded on road according to the performance indicators of the Hungarian economy measured by the National Statistics Office. This performance is now supported by heavy goods vehicles (HGV) running on fossil fuels, almost exclusively on diesel. A great deal of scientific research concerns the usage of state of the art electric engines and other zero or low emission solutions in road freight transport.

The introduction and penetration of electric battery and hydrogen fuel cell driven road freight vehicles require new approach from the side of charging and fueling infrastructure. Not only the distance that can be covered with the battery capacity matters, but the hours of service and other safety and shipping constraints too, as long as autonomous trucks are not widespread enough.

In the case of electric battery charging a lot depends on the appropriate grid conditions at parking lots and fuel stations, while at the case of fuel cell vehicles one of the future possibilities is distributed storage of carbon-free electric power generated liquid or gaseous hydrogen.

The renewal and development of electric grid is essential for these special needs, while the competition between the concurrent technologies is still open. As the electric grid was initially established for lighting needs, the main consumers are rather stationary rotating machineries today (pumps, fans, compressors, etc), and the electric or hydrogen driven vehicles will apply for their share in the foreseeable future - it is necessary to provide sustainable, secure and reliable electricity supply during the transition to zero-emission road freight systems.

In our paper we are presenting a conceptual framework for further analysis, covering the grid and energy management issues and the available charging time distribution based on observing the truck flow at some Hungarian rest areas along the main transport corridors.

Although there are possibilities for extending driving hours or limited rest periods for drivers of self-driven vehicles the near future, this scenario can highlight the critical factors of infrastructure development that stakeholders and decision makers should consider when investing in a typically long-life infrastructure like the electric grid.

References

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