Analysis of the Effects of Electrification of the Road Transport Sector on the Possible Penetration of Nuclear Fusion in the Long-Term European Energy Mix

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Energies 2020,**13**, 3634; DOI: 10.3390/en13143634

Abstract:

The European Roadmap towards the production of electricity from nuclear fusion foresees the potential availability of nuclear fusion power plants (NFPPs) in the second half of this century. The possible penetration of that technology, typically addressed by using the global energy system EUROFusion TIMES Model (ETM), will depend, among other aspects, on its costs compared to those of the other available technologies for electricity production, and on the future electricity demand. This paper focuses on the ongoing electrification process of the transport sector, with special attention devoted to road transport. A survey on the present and forthcoming technologies, as foreseen by several manufacturers and other models, and an international vehicle database are taken into account to develop the new road transport module, then implemented and harmonized inside ETM. Following three different storylines, the computed results are presented in terms of the evolution of the road transport demand in the next decades, fleet composition andCO_2emissions. The ETM results are in line with many other studies. On one hand, they highlight, for the European road transport energy consumption pattern, the need for dramatic changes in the transport market, if the most ambitious environmental goals are to be pursued. On the other hand, the results also show that NFPP adoption on a commercial scale could be justified within the current projection of the investment costs, if the deep penetration of electricity in the road transport sector also occurs.