World Academy of Science, Engineering and Technology
International Journal of Transport and Vehicle Engineering
Vol:19, No:12, 2025

Analysis of Electric Mobility in the European Union: Forecasting 2035

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Abstract : The context is that of great uncertainty in the 27 countries belonging to the European Union which has adopted an epochal measure: the elimination of internal combustion engines for the traction of road vehicles starting from 2035 with complete replacement with electric vehicles. If on the one hand there is great concern at various levels for the unpreparedness for this change, on the other the Scientific Community is not preparing accurate studies on the problem, as the scientific literature deals with single aspects of the issue, moreover addressing the issue at the level of individual countries, losing sight of the global implications of the issue for the entire EU. The aim of the research is to fill these gaps: the technological, plant engineering, environmental, economic and employment aspects of the energy transition in question are addressed and connected to each other, comparing the current situation with the different scenarios that could exist in 2035 and in the following years until total disposal of the internal combustion engine vehicle fleet for the entire EU. The methodologies adopted by the research consist in the analysis of the entire life cycle of electric vehicles and batteries, through the use of specific databases, and in the dynamic simulation, using specific calculation codes, of the application of the results of this analysis to the entire EU electric vehicle fleet from 2035 onwards. Energy balance sheets will be drawn up (to evaluate the net energy saved), plant balance sheets (to determine the surplus demand for power and electrical energy required and the sizing of new plants from renewable sources to cover electricity needs), economic balance sheets (to determine the investment costs for this transition, the savings during the operation phase and the payback times of the initial investments), the environmental balances (with the different energy mix scenarios in anticipation of 2035, the reductions in CO2eq and the environmental effects are determined resulting from the increase in the production of lithium for batteries), the employment balances (it is estimated how many jobs will be lost and recovered in the reconversion of the automotive industry, related industries and in the refining, distribution and sale of petroleum products and how many will be products for technological innovation, the increase in demand for electricity, the construction and management of street electric columns). New algorithms for forecast optimization are developed, tested and validated. Compared to other published material, the research adds an overall picture of the energy transition, capturing the advantages and disadvantages of the different aspects, evaluating the entities and improvement solutions in an organic overall picture of the topic. The results achieved allow us to identify the strengths and weaknesses of the energy transition, to determine the possible solutions to mitigate these weaknesses and to simulate and then evaluate their effects, establishing the most suitable solutions to make this transition feasible.

Keywords : engines, Europe, mobility, transition
Conference Title : ICEVBMIS 2025 : International Conference on Electric Vehicles, Battery Management and Intermediate Storage
Conference Location : Auckland, New Zealand
Conference Dates : December 01-02, 2025