PERFORMANCE CHARACTERISTICS OF ELECTRIC AND HYBRID VEHICLES IN URBAN CONDITIONS

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Annotatsiya: Elektr va gibrid transport vositalari shahar sharoitida ishlash xususiyatlari haqida so‘z yuritishda, avvalo ularning ekologik, iqtisodiy va texnik jihatlari o‘rganilishi zarur. Shaharlar kundan-kunga rivojlanib borayotgan hududlar bo‘lib, transportning samarali va atrof-muhitga zarar yetkazmaydigan turlariga bo‘lgan talab oshib bormoqda. Shu nuqtai nazardan, elektr va gibrid transport vositalari shahar ichidagi harakat uchun ideal yechim sifatida qaraladi.

Kalit so‘zlar: elektr va gibrid transport, atrof-muhit, sanoat korxonalari, ichki yonish dvigateli, transport oqimlari, gibrid avtomobillar.

Аннотация: При обсуждении производительности электромобилей и гибридных автомобилей в городских условиях необходимо сначала изучить их экологические, экономические и технические аспекты. Города развиваются с каждым днем, и спрос на эффективные и экологически чистые виды транспорта растет. В связи с этим электромобили и гибридные автомобили считаются идеальным решением для городской мобильности.

Ключевые слова: электротранспорт и гибридный транспорт, окружающая среда, промышленные предприятия, двигатель внутреннего сгорания, транспортные потоки, гибридные автомобили.

Abstract: When discussing the performance of electric and hybrid vehicles in urban environments, it is necessary to first study their environmental, economic and technical aspects. Cities are developing areas every day, and the demand for efficient and environmentally friendly modes of transport is increasing. In this regard, electric and hybrid vehicles are considered an ideal solution for urban mobility.

Keywords: electric and hybrid transport, environment, industrial enterprises, internal combustion engine, traffic flows, hybrid cars.

INTRODUCTION

The main advantage of electric vehicles is that their environmental impact is minimal. Since they do not have any internal combustion process, no harmful gases are released into the atmosphere. This helps reduce urban air pollution, especially in areas with dense industrial enterprises and traffic flows. In addition, electric vehicles produce little noise during operation, which improves the quality of life of urban residents. Noise reduction is particularly important at night and in densely populated areas.

MATERIALS AND METHODS

Hybrid vehicles, on the other hand, consist of a combination of an electric motor with an internal combustion engine, and their system of operation provides more flexibility in urban conditions. Vehicles of this type use mainly electricity over short distances, while on long roads they switch to an internal combustion engine. Thus, hybrid cars will be able to effectively operate over long distances, in addition to taking advantage of all the benefits of electricity in intra-city movements. There are a number of important factors in improving the performance of electric and hybrid vehicles in urban conditions. One of them is the development of the power charging infrastructure. The availability of adequate charging stations throughout the city is necessary for the widespread availability of electric vehicles. This makes it more user-friendly and increases vehicle operating time. Charging speed is also important. The ability to charge quickly makes intra-city movements more efficient, as users do not have to wait for a long charging time.[1]

For hybrid vehicles, however, fuel efficiency and automatic engine switching play an important role. In urban conditions, frequent stop-and-go situations are common, therefore, the operation of the engine in optimal mode reduces fuel consumption and helps to reduce emissions. This serves to improve the urban environment, not only economically viable but also environmentally friendly. Another important feature of electric and hybrid vehicles in the urban transportation system is the low cost of their maintenance compared to conventional internal combustion engine cars. Electric motors have low wear rates due to their lower mechanical parts, which reduces maintenance and maintenance costs. Hybrid cars, in turn, require special maintenance to ensure the harmonious operation of electric and internal combustion engine systems, but the total costs may be less than in conventional cars. Also important in urban conditions is the efficiency and ease of movement of vehicles. Electric and hybrid vehicles often have a smaller and more compact design, convenient for urban streets and narrow roads. Their quick response and gentle movement will help improve traffic flow in the city. This leads to reduced traffic congestion, increased traffic safety, and reduced travel time.[2]

RESULTS AND DISCUSSIONS

The use of electric and hybrid vehicles in the urban transport system is expanding not only in personal transport, but also in public transport. Electric buses and hybrid minibuses are being perceived as an environmentally friendly and cost-effective solution for passenger transportation in cities. Their operation ensures the stability of the transport system, while reducing pollution of the city's air. At the same time, the transition of public transport to electric or hybrid options reduces the need for fuel imports in cities and has a positive effect on the national economy.[3]

Their energy efficiency also plays an important role in assessing the performance characteristics of electric and hybrid vehicles in urban conditions. The energy efficiency of electric cars is much higher compared to conventional internal combustion engines, which is a huge advantage for their long-term operation. Hybrid cars, on the other hand, are able to optimally control energy in different modes of movement, increasing efficiency on roads with high number of stop-and-go situations within the city.In addition, climatic conditions also play an important role in the operation of electric and hybrid vehicles in urban conditions. In cold climates, battery efficiency may decrease, reducing the vehicle's operating range. Therefore, manufacturers are introducing various technologies to make batteries frost-resistant and maintain their capacity. Special systems are also being developed for the efficient operation of battery and engine systems in hot climates. The issue of safety is also important in urban transport. Electric and hybrid vehicles are equipped with modern safety systems, which helps to increase traffic safety. Also, their low noise levels increase safety for pedestrians and cyclists, as sounds in the environment sound better. Another important aspect is the issue of integration in the urban transport system. Electric and hybrid vehicles require flexible systems to operate in conjunction with other modes of transport. For example, charging stations need to be located near public transport stops, as well as the development of vehicle interconnections and information exchange systems. This serves to increase the overall efficiency of urban transportation. The widespread use of electric and hybrid vehicles in urban settings is also of great social importance. These vehicles help to improve the health of the population, improve the quality of the streets and living areas of the city. At the same time, through the introduction of new technologies, the opportunity arises to develop the city's economy, to create new jobs. As a result, electric and hybrid vehicles are ideal for urban mobility, and their performance characteristics play an important role in ensuring the stability of the urban transport system. Their environmental friendliness, energy efficiency, ease of maintenance, as well as their harmonization with urban infrastructure serve to improve the quality of urban life. Therefore, it is expected that in the future the main part of urban transport will consist of exactly these types of vehicles.[4]

Meanwhile, there are also certain difficulties. For example, problems such as the lack of charging stations, the cost of battery technologies, and the limitation of their operating life have not yet been fully resolved. At the same time, large investments are required to upgrade and expand the infrastructure of the city. However, with the development of technologies and the support of public policy, these problems are gradually being overcome. Also an important factor is the attitude of the population to new technologies and their adoption. Providing information about electric and hybrid vehicles through a wide range of media, encouraging users, and creating support systems can help ensure that urban transportation is environmentally friendly and efficient.[5]

CONCLUSION

Thus, electric and hybrid vehicles have many advantages in terms of characteristics of operation in urban conditions, which are considered as the future of urban transport. And for them to work effectively, infrastructure, technology, economic and social factors need to be developed together. This serves to improve sustainable urban development and ecological status.

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