PRESENT STATUS AND FUTURE TRENDS OF END-OF-LIFE VEHICLES IN MACAU

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Abstract

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As number of vehicles increased rapidly in recent years, disposal of end-of-life vehicles is becoming a prominent issue and drawing more attention. Comparative analysis of management status for end-of-life vehicles in Macau is made to propose recommendations for improvement. System dynamic method complementing by other methods are applied to forecast the number of end-of-life vehicles in the next decade.

With the system dynamic model involving economic and social factors, the total vehicle ownership could be predicted as around 306,000 in 2020 with the average annual growth rate of 4.5%. And the number of ELVs (end-of-life vehicles) produced is predicted, system dynamic method for vehicles in I/M retirement system and market supply method for vehicles in mandatory retirement system, to be about 27,500 by the year 2020 with the average annual growth rate of 9.8%. According to the predicted numbers of different types of ELVs, several major waste materials could be estimated by weight and the change of vehicle exhaust emissions of Macau could be predicted with the extended model.

Major factors impacting vehicle exhaust emissions in Macau are discussed. The total vehicle fuel demand is also discussed on the basis of the extended model and the calculation method.

The results simulated by system dynamic model for vehicle ownership and ELVs are reliable. And the forecasting results of vehicle ownership, end-of-life vehicles and exhaust emissions show a rapid growth in the next decade. Increasing scrapped materials generated by end-of-life vehicles will bring great environmental pressure to Macau.

ELVs dismantling industries in Macau needs the involvement of environmental authorities. Referencing to the relevant standards of other developed countries and regions described in this paper, dismantling factories are supposed to standardized by developing an industry standard specification to improve the efficiency and resource recovery rate and Macau should consider developing its own laws and regulations for regulating motor vehicle dismantling industry in order to bring more benefits to the environment.

Factors leading to rational growth are figured out in the system dynamic model. Because of the rising inflation, the economy will be affected followed by a fluctuation in car ownership and the number of ELVs. More ELVs bringing greater the pressure on the environment will lead to policy preferences. As the improvement of manufacturing and repair techniques, vehicle will have longer life. Other factors involved in ELVs rational growth: population, consumption expenditure, land resources, road conditions, resource recovery level etc. So to effective control the increasing number of ELVs, those factors should be monitored to update the relation equations in the model for the purpose of more accurate forecasts and better solution of controlling the increasing ELVs.

Based on the prediction of emissions, motorcycle is in dominant position of CO emissions. Heavy vehicles seem to be the major emitters for CO_2 and THC emissions. Therefore, future emission test in I/M retirement system for motorcycles should pay more attention to the CO emission test. Since periodical inspection can better monitor the emissions, there should be some reforms for the mandatory retirement system in Macau.

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