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基于LCA的北京市公交车节能及温室气体减排潜力分析

### Analysis of energy conservation and greenhouse gas emissions reduction potential of buses in Beijing city based on life cycle assessment

关键词: [生命周期评价](#) [公交车服务功能](#) [节能潜力](#) [温室气体减排潜力](#)

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**摘要:** 新能源公交车是未来城市公交行业节能及温室气体减排的重点发展方向。新能源公交车在行驶阶段具有良好的节能及温室气体减排效果,而汽车制造、能源生产等相关生命周期阶段的能耗及温室气体排放常被忽视,且目前新能源公交车的乘客运载功能相对较弱,可能对节能及温室气体减排的潜力造成较为显著的影响。因此,本文基于北京市公交车的运营特征,采用生命周期评价(LCA)方法,选择客运周转量作为功能单位,核算了天然气公交车、混合动力公交车和纯电动公交车等新能源公交车相对于柴油公交车的节能及温室气体减排效益。结果表明:发展新能源公交车对促进北京市公交行业及城市节能低碳发展具有积极的作用,但相对于基于运营里程的核算结果,本研究新能源公交车节能及温室气体减排潜力均较低,主要原因是新能源公交车的实际载客量相对较低;混合动力公交车和纯电动公交车在空调开启时的节能潜力与温室气体减排潜力均远低于天然气公交车;通过发展情景分析,建议北京市现阶段应优先发展天然气公交车,适当发展纯电动公交车和混合动力公交车,以减少北京市公交车的总体能耗,同时降低温室气体排放强度。

**Abstract:** The new energy buses will be the key products for energy conservation and greenhouse gas emissions reduction of public transportation system in the future. As energy conservation and greenhouse gas (GHG) emissions from new energy buses are significantly lower than traditional fuel oil-based buses, their energy consumption and greenhouse gas emissions are not well studied. Further, there are still gaps between the transportation function of new energy buses and fuel oil based buses, including passenger carrying capacity. Therefore, taking real world operation characteristics into consideration, this study employs life cycle assessment method to compare the energy conservation and GHG emissions of conventional diesel buses (CDB) and a series of new energy buses, including natural gas buses (NGB), diesel hybrid electric buses (DHEB) and battery electric buses (BEB). And based on LCA results, different new energy bus development strategies of Beijing are compared as a case study. It is concluded that the energy conservation and greenhouse gas emissions reduction potential of new energy buses is partly offset because of lower average passenger carrying capacity. DHEB and BEB are more sensitive to the function of air conditioning, and their energy consumption and GHG emissions will increase more significantly than NGB if the air-conditioner is on. The result of case study in Beijing indicates that, the development of NGB should be given higher priority than BEB and DHEB. The above conclusions provide a reference for choosing development direction of new energy buses.

**Key words:** [life cycle assessment](#) [service function of bus](#) [energy conservation potential](#) [greenhouse gas emissions reduction potential](#)

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