

Life cycle assessment of asphalt pavement construction in Sabah

Abstrak

Road pavement layered above subgrade plays an important role in road construction by ensuring a safe surface for traffic, providing waterproofing layer to protect and improve strength and durability of the road. Social and economic progress of mankind leads to increased vehicle use. A vast amount of non-exhaust particulate matter emission emitted to the atmosphere contributing to global climate change. Unfortunately there is leaking of effort in quantifying emission. To effectively quantify and assess these emissions, Life Cycle Assessment (LCA) was used. Pavement Life Cycle Assessment Tool for Environmental and Economic Effects was used as the LCA model in this paper. Case studies in Lubuk-Buyut and Yayasan- Kibagu road projects were conducted in Sabah have been studied by incorporating input in terms of design, initial construction, equipment and costs of roadways. It was found that the energy outputs released were 129,782,562MJ and 112,794,192MJ respectively for both case studies while non-exhaust particulate matter (PM10) emissions were estimated 20,933kg and 16,509kg for Lubuk Buyut and Yayasan Kibagu. The study shows that the transportation and manufacturing impacts of the materials used in the project specially the manufacturing of the fuel and equipment used show the significant impact to the environmental results. Therefore, this paper quantifies and assesses the environmental impact during asphalt pavement construction using LCA to reduce harmful emissions to the environment and human. This paper also found that the LCA tools would be beneficial to estimate design life and construction cost of pavement which can be estimated earlier before road pavement construction.